

FIGURE 1 - General Overview of Distributed File Storage System

Communication  
with other server  
nodes

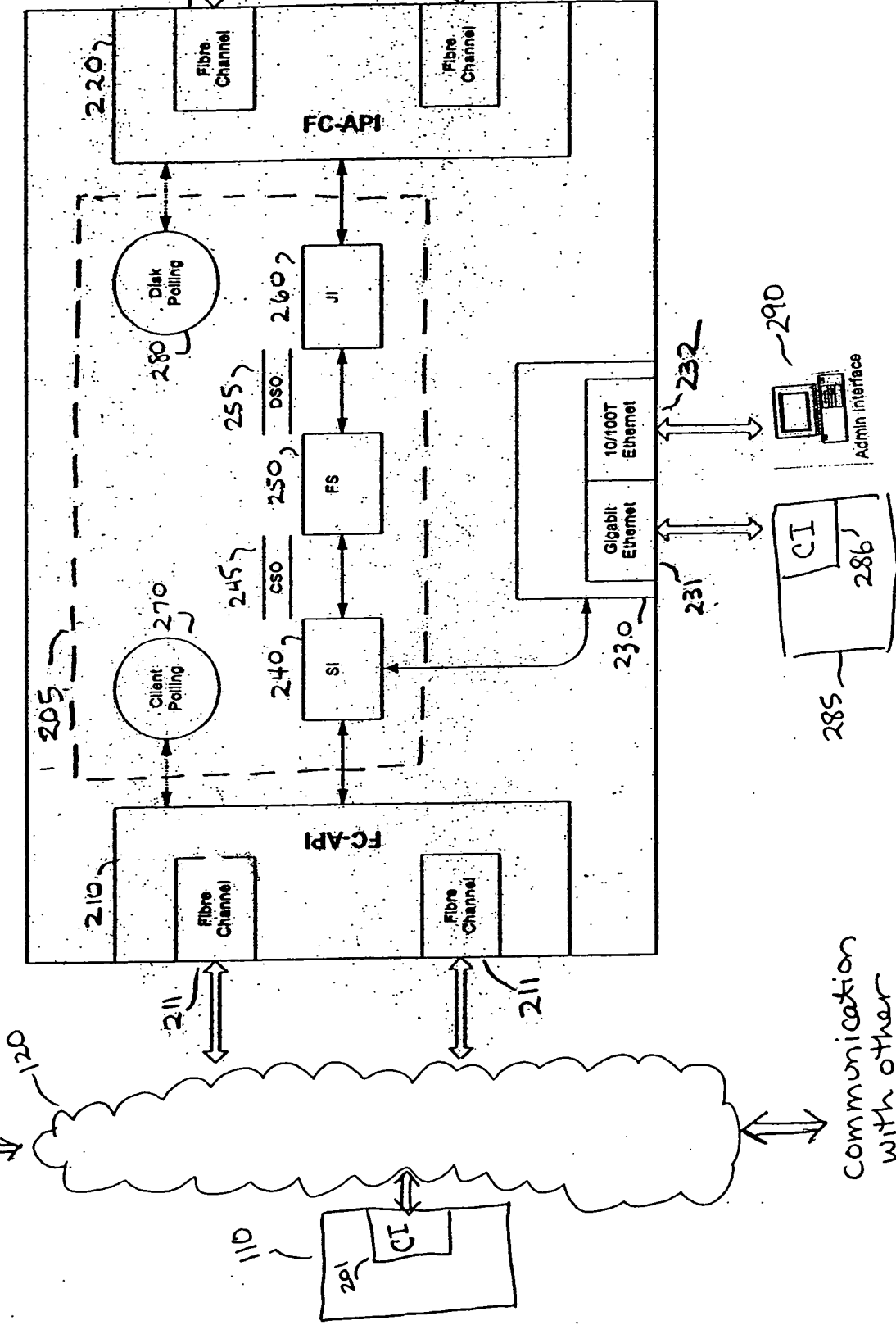


FIGURE 2 : One Embodiment of a Server Node

communication  
with other  
server nodes

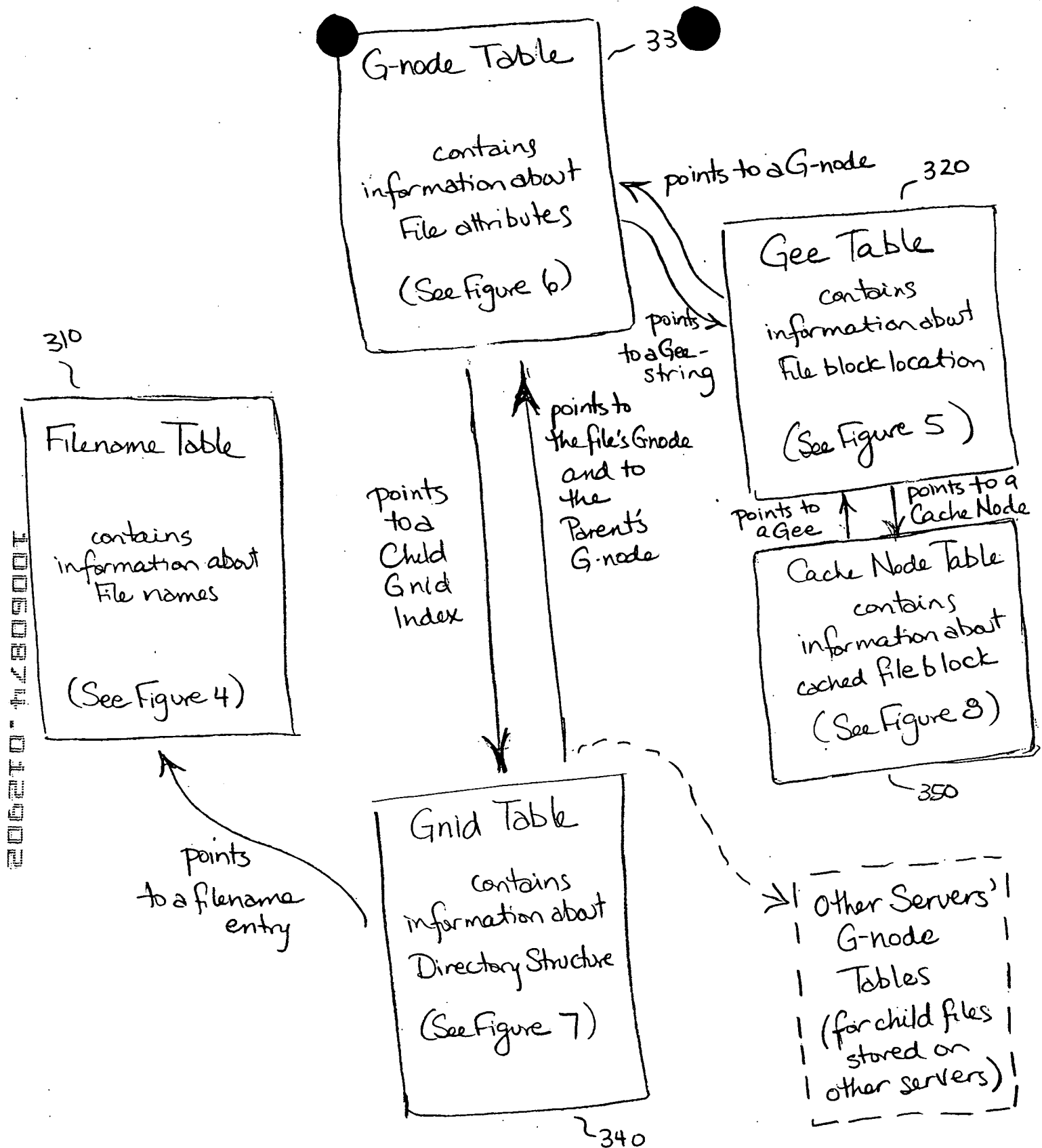


FIGURE 3 - Five metadata structures

310

		Array Index		Array Index	
410	411	70	<SOS>	85	<DS>
	412	71	csum	86	csum
	413	72	3	87	4
	414	73	'D'	88	'F'
		74	'o'	89	'r'
		75	'e'	90	'o'
	421	76	<SOS>	91	'g'
	422	77	csum	92	<SOS>
	423	78	6	93	csum
	420	79	'T'	94	2
80		'h'	95	'I'	
81		'o'	96	'T'	
424		82	'm'	97	<SOS>
83		'a'			
84		'S'			
	</				

FIGURE 4- Sample Portion of a Filename Table

206270-1489900T

320

590      591      592

	Index	G-Code	Data	File Logical Block
S10-	45	GNODE	Gnode = 67, Extent = 2, Root = TRUE	
S11-	46	DATA	Disk Logical Blocks: 456, 457 Drive 13	1
S12-	47	DATA	Disk Logical Blocks: 667, 668 Drive 15	2
S13-	48	DATA	Disk Logical Blocks: 112, 113 Drive 19	3
S14-	49	PARITY	Disk Logical Blocks: 554, 555 Drive 2	
S15-	50	DATA	Disk Logical Blocks: 458, 459 Drive 13	4
S16-	51	DATA	Disk Logical Blocks: 669, 670 Drive 15	5
S17-	52	DATA	Disk Logical Blocks: 119, 120 Drive 19	6
S18-	53	PARITY	Disk Logical Blocks: 556, 557 Drive 2	
S19-	54	LINK	Index 76	
	...	...	...	
S20-	76	GNODE	Gnode = 67, Extent = 3, Root = FALSE	
S21-	77	DATA	Disk Logical Blocks: 460, 461, 462 Drive 13	7
S22-	78	DATA	Disk Logical Blocks: 671, 672, 673 Drive 15	8
S23-	79	PARITY	Disk Logical Blocks: 121, 122, 123 Drive 19	
S24-	80	LINK	Index 88	
	...	...	...	
S25-	88	GNODE	Gnode = 67, Extent = 3, Root = FALSE	
S26-	89	DATA	Disk Logical Blocks: 463, 464, 465 Drive 13	9
S27-	90	DATA	Disk Logical Blocks: 674, 675, 676 Drive 15	10
S28-	91	PARITY	Disk Logical Blocks: 124, 125, 126 Drive 19	
S29-	92	GNODE	Gnode = 43, Extent = 4, Root = FALSE	
	...	...	...	

550  
551  
552

500

FIGURE 5 - Sample Portion of a Gee Table

200270-012002

Attribute Data	
602	File Attribute - type
604	File Attribute - mode
606	File Attribute - links
608	File Attribute - uid
610	File Attribute - gid
612	File Attribute - size
614	File Attribute - used
620	File Attribute - fileId
622	File Attribute - atime
624	File Attribute - mtime
626	File Attribute - ctime
628	Child Gnid Index
630	Gee Index - Last Used
631	Gee Offset - Last Used
632	Gee Index - Midpoint
633	Gee Offset - Midpoint
634	Gee Index - Tail
635	Gee Offset - Tail
636	Gee Index - Root
638	Gnode Status
640	Quick Shot Status
642	Quick Shot Link

600

FIGURE 6 - G-NODE ATTRIBUTES

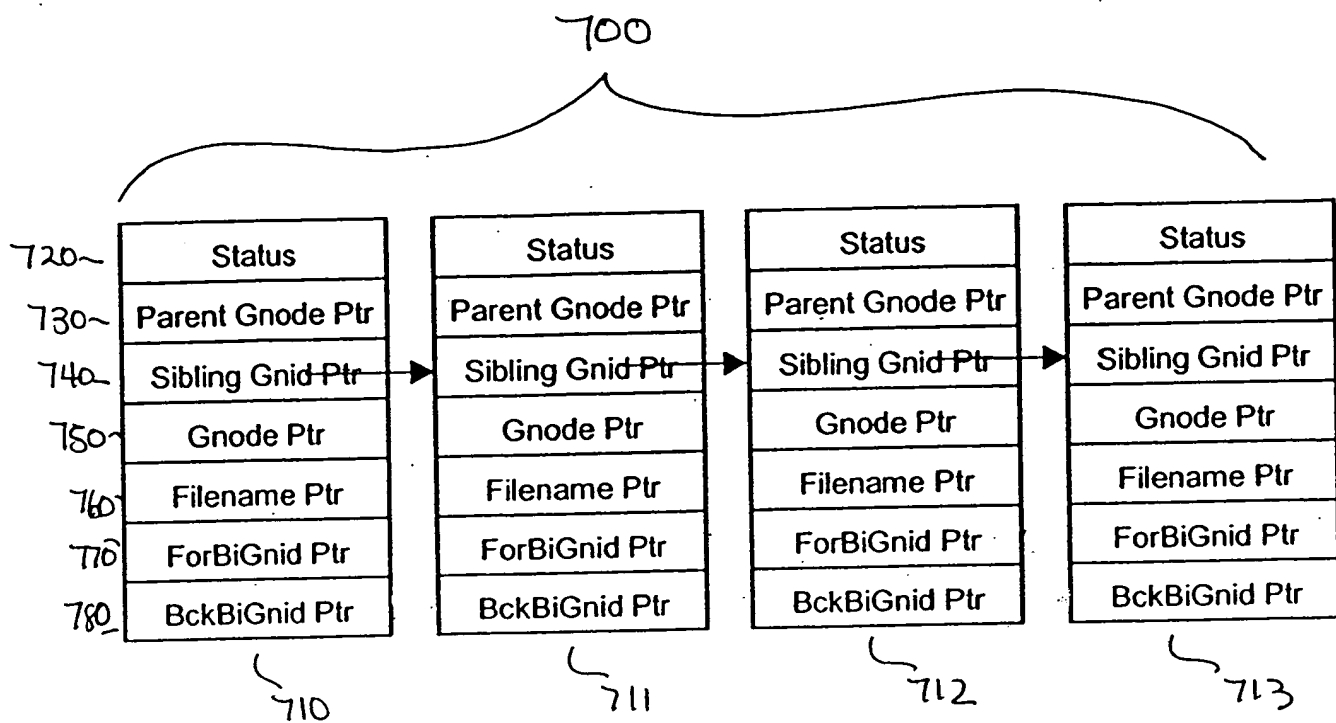


FIGURE 7- Structure of a Gnid String

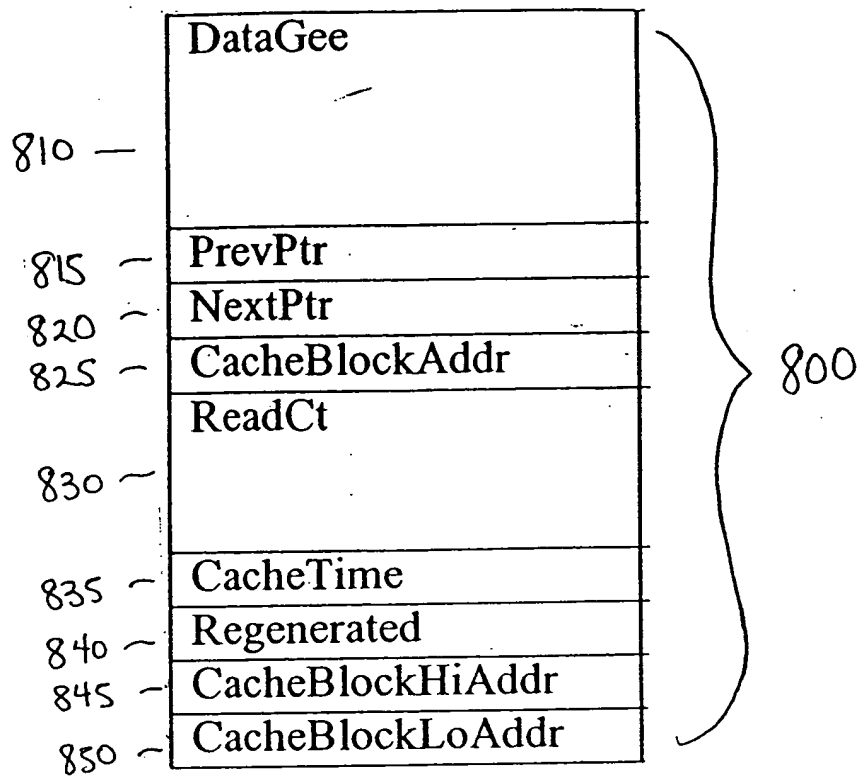


FIGURE 8a - Structure of a Cache Node



350

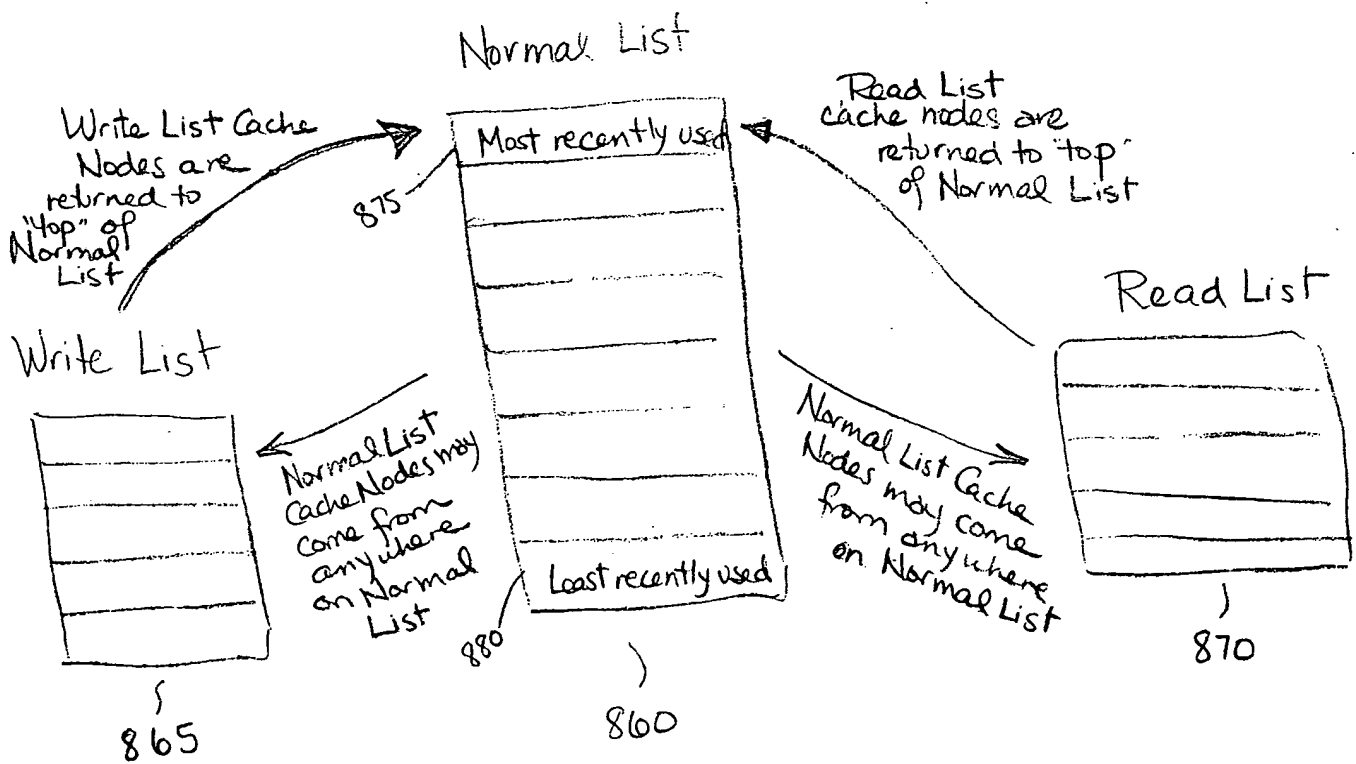


FIGURE 8B - Conceptual division of a Cache Node Table into Three Lists

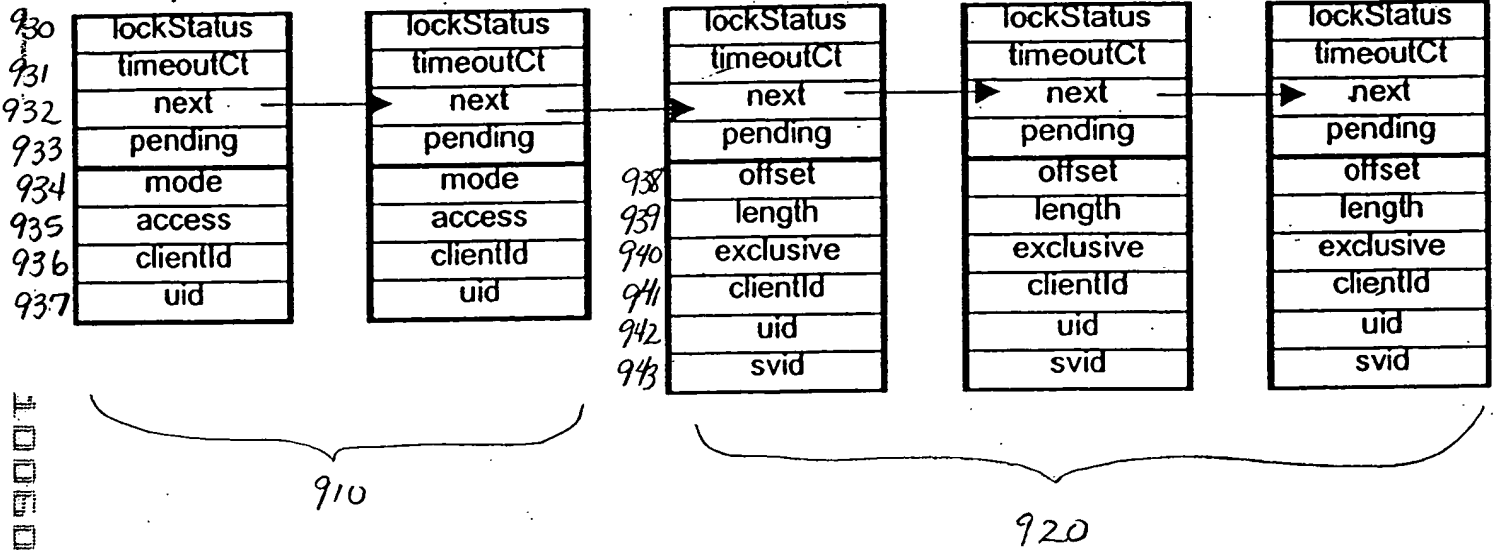


FIGURE 9 - A Sample Lock String

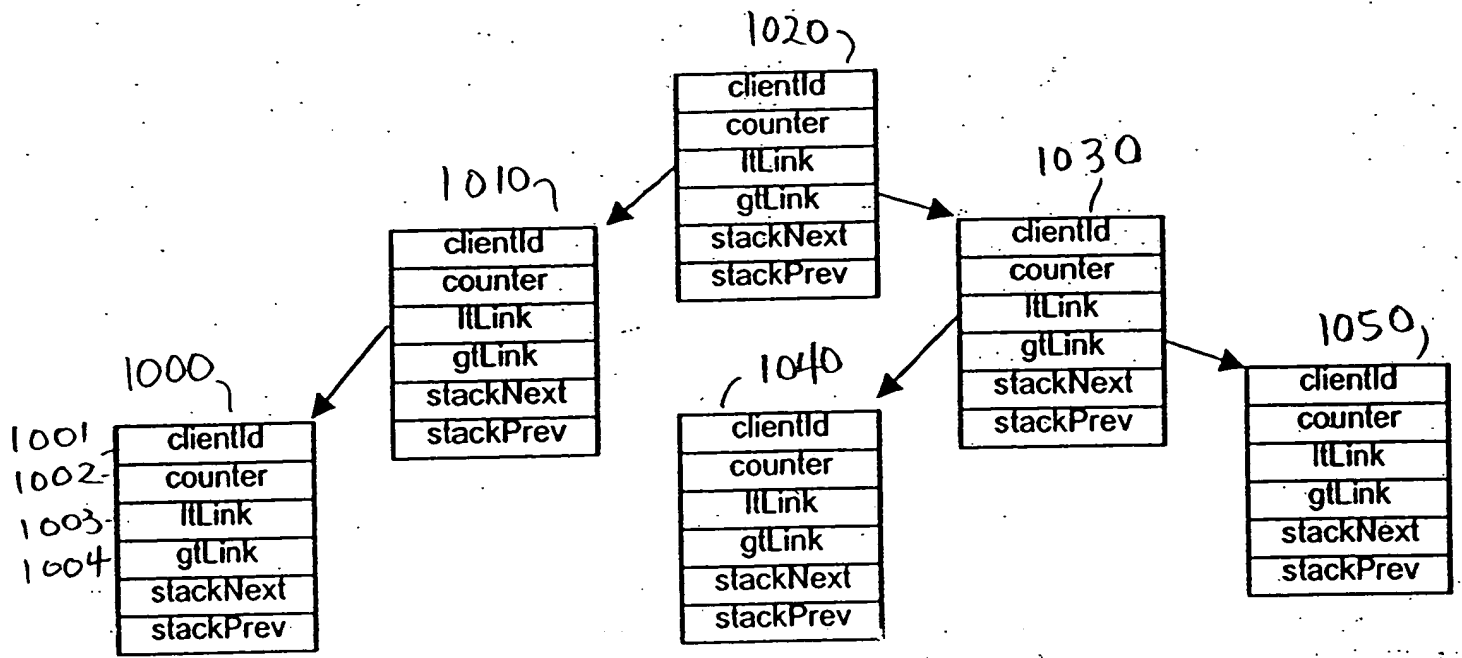


FIGURE 10 - Refresh Nodes configured as a binary tree.

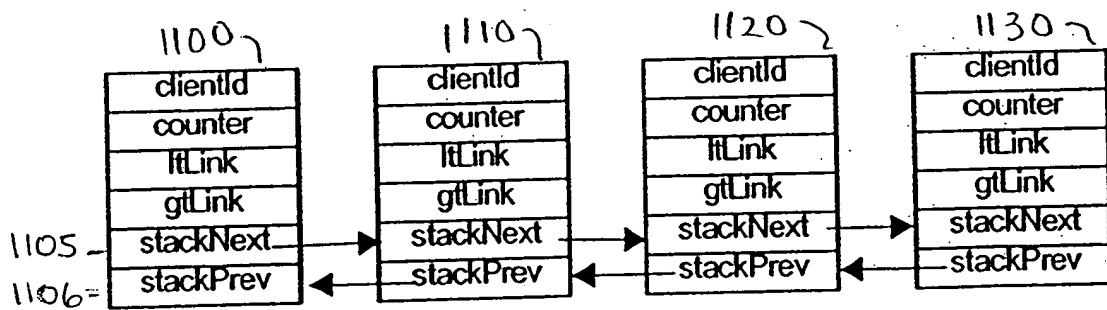


FIGURE 11 - Refresh Nodes configured as a doubly-linked list

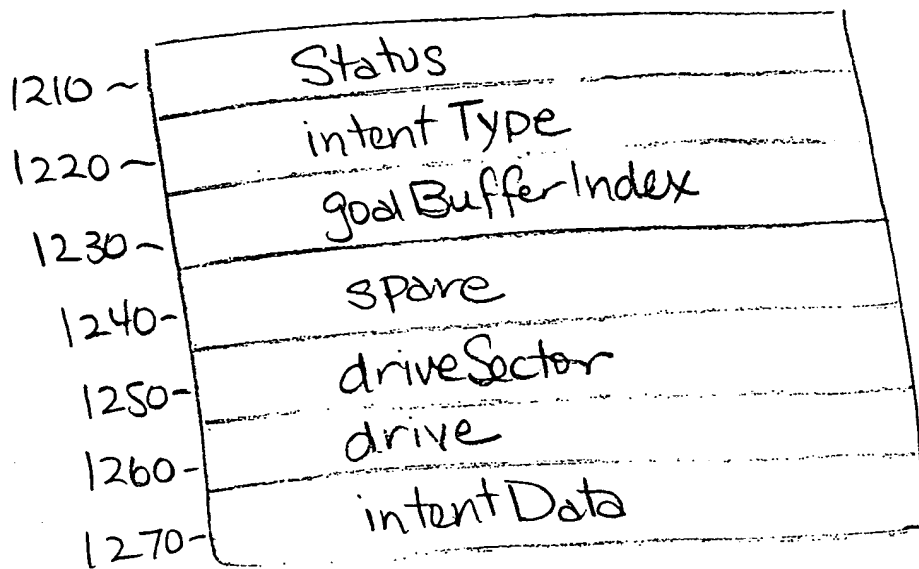


FIGURE 12 - Structure of an Intent Log Entry

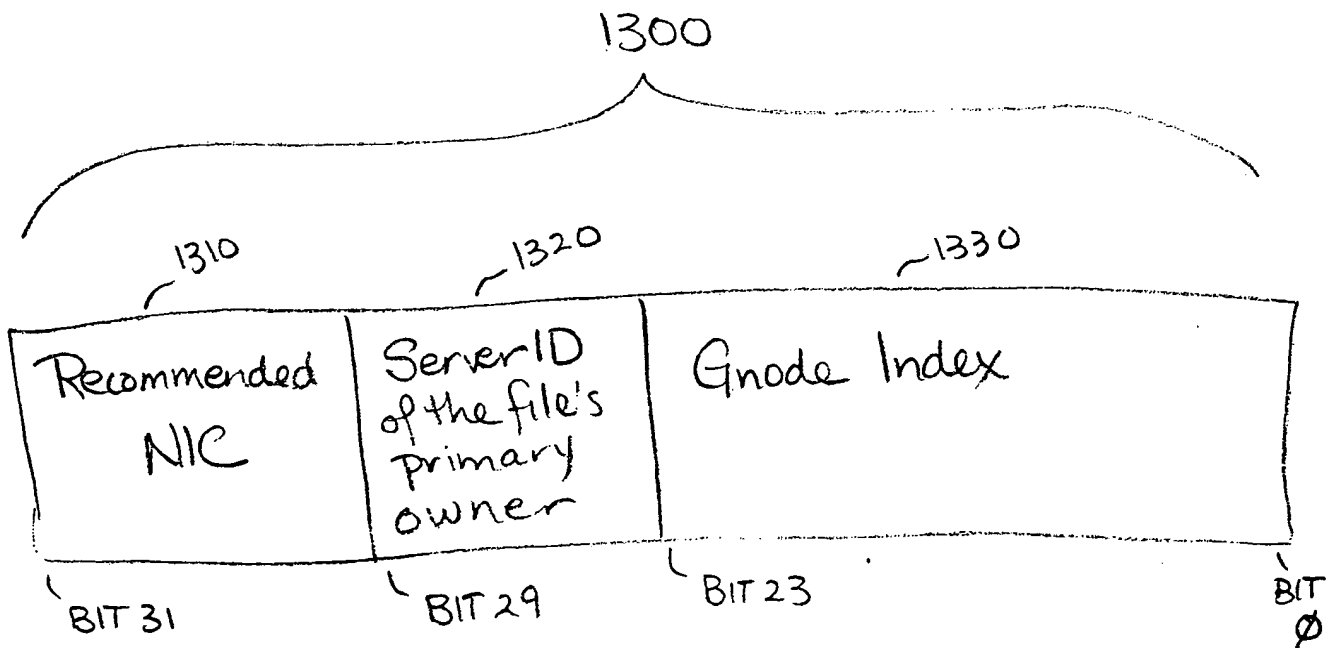


FIGURE 13 - Structure of a File Handle

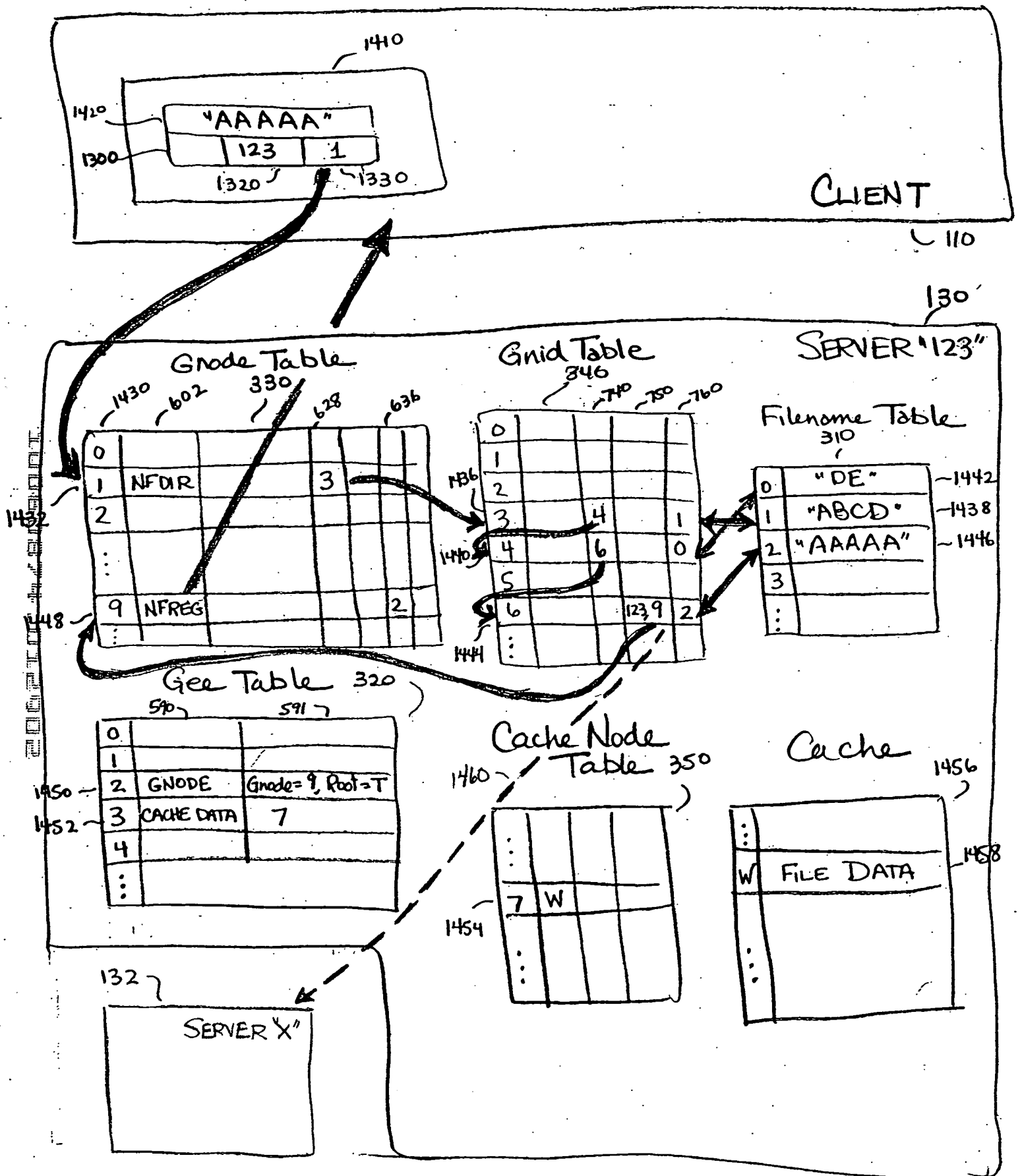


FIGURE 14a: Example of a File Look-Up

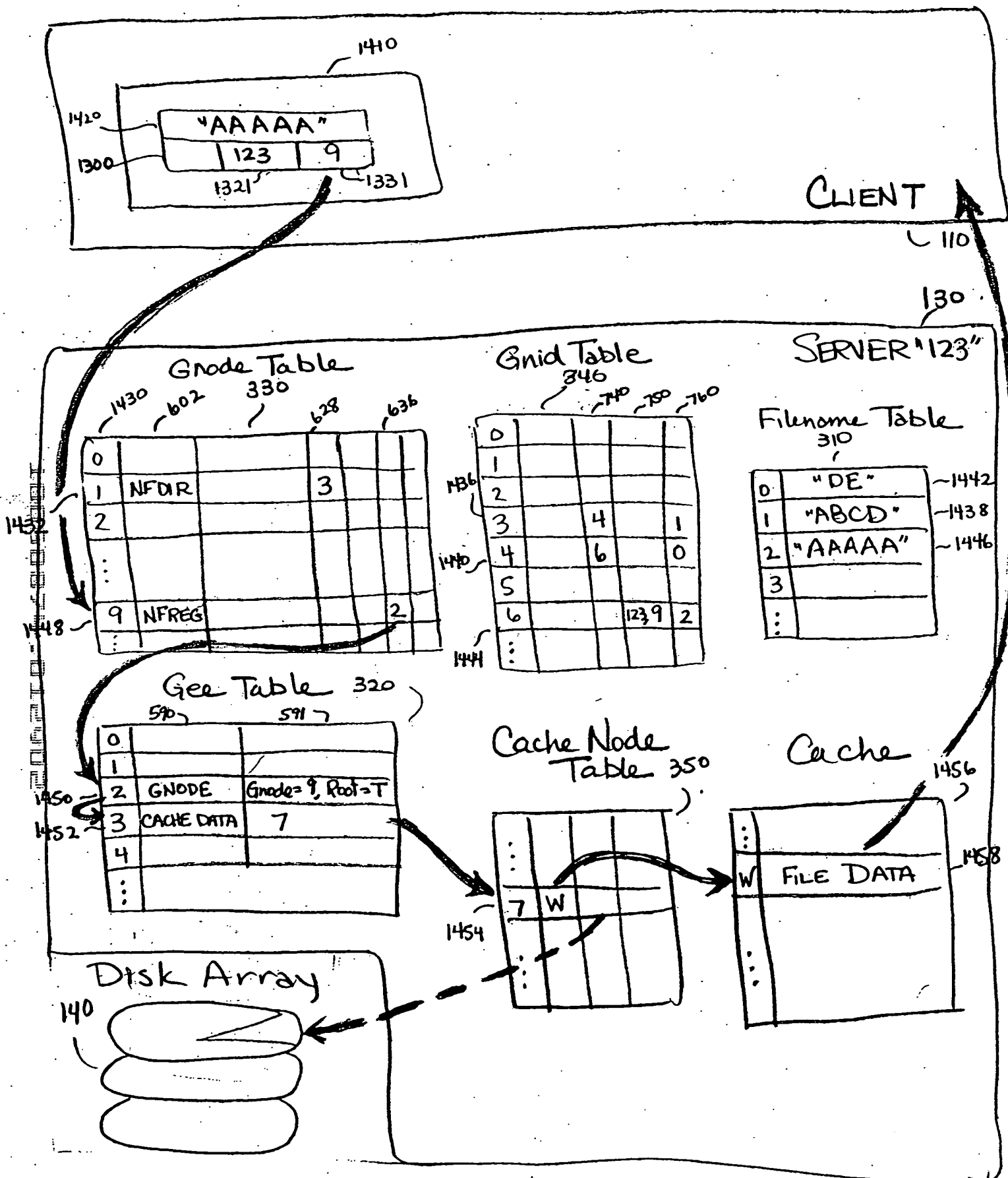


FIGURE 14b Example of a File Access

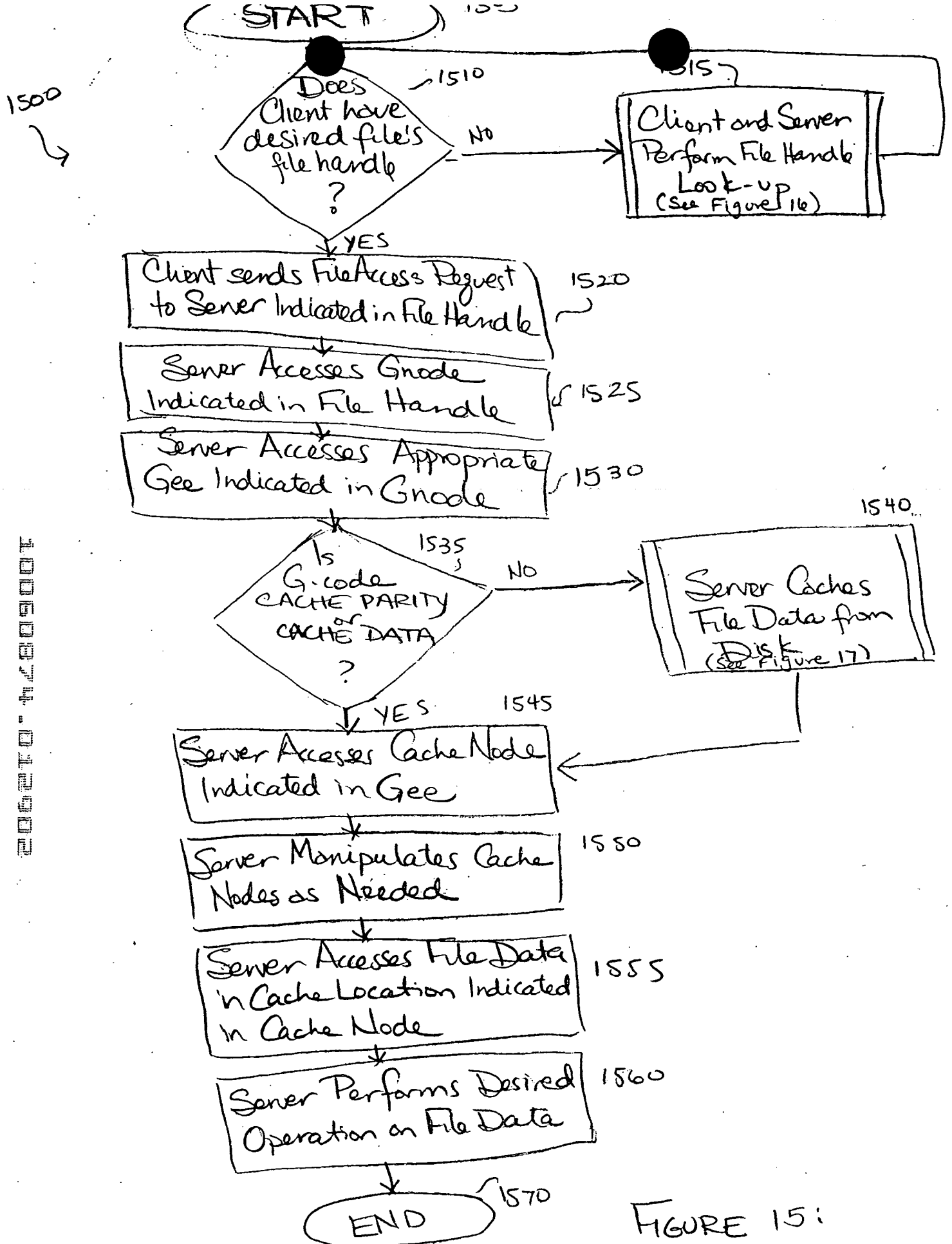


FIGURE 15:  
Performing a File Access

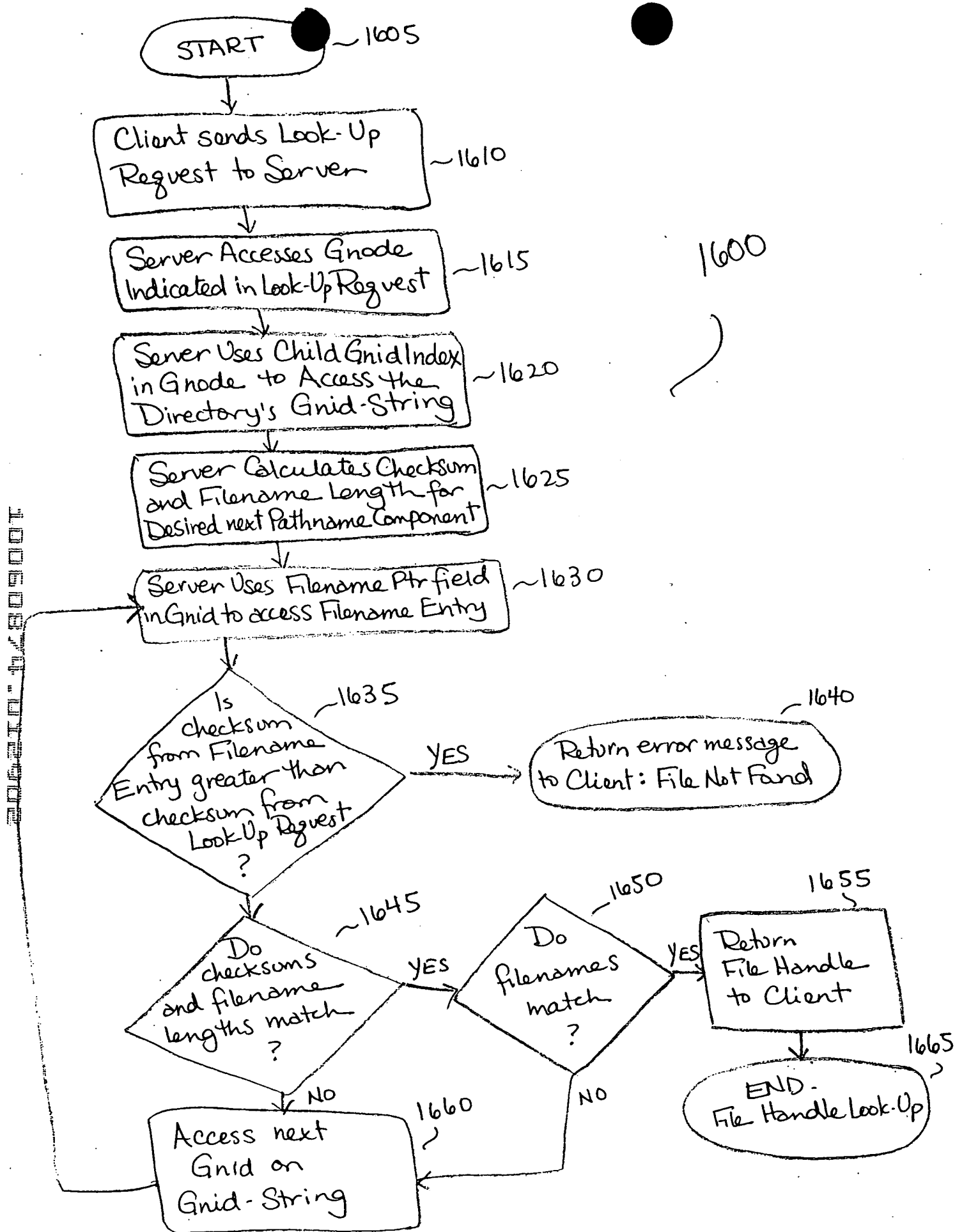


FIGURE 16: Performing a File Handle Look-Up



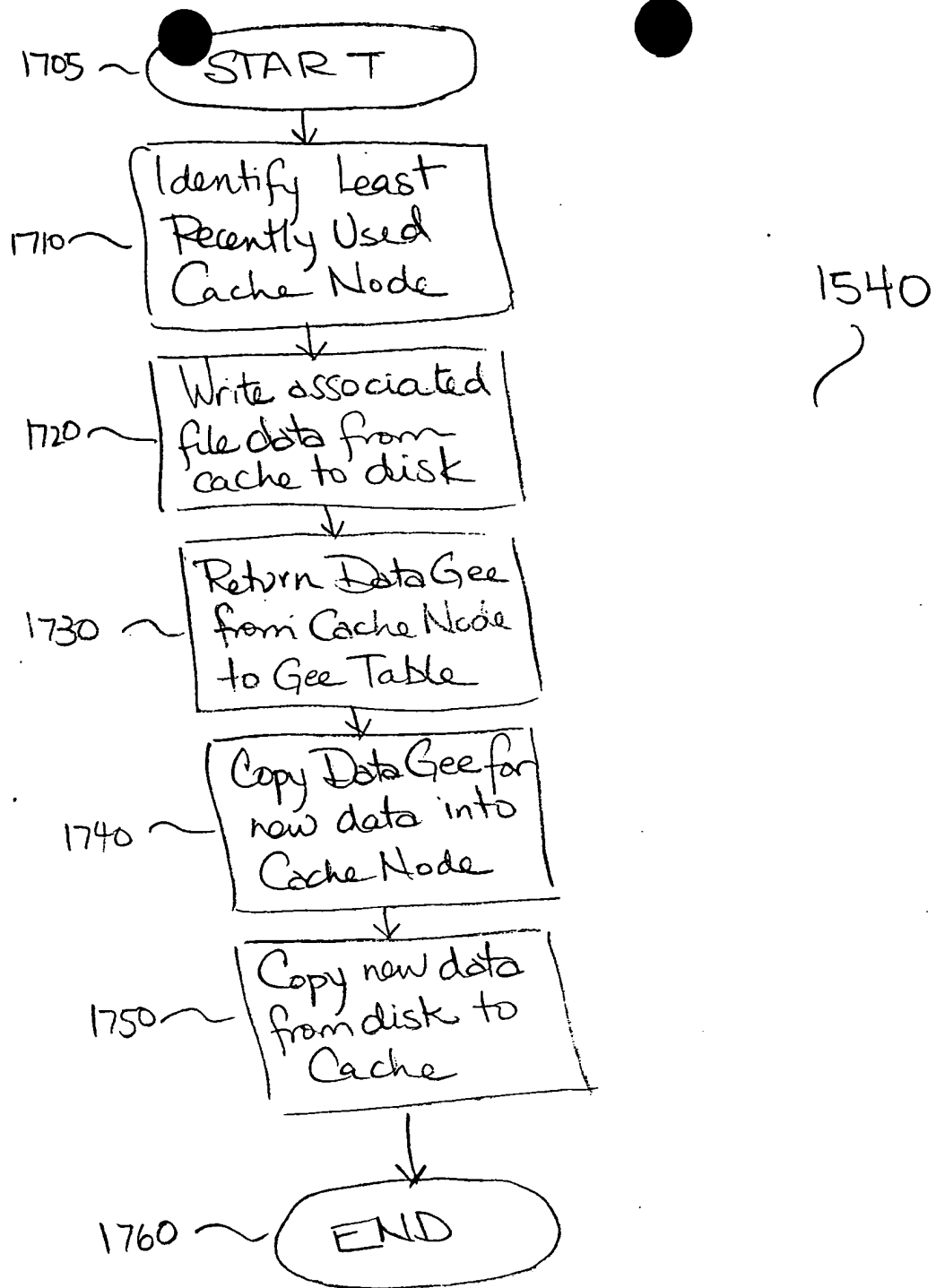


FIGURE 17: Caching File Data

2006274-012902

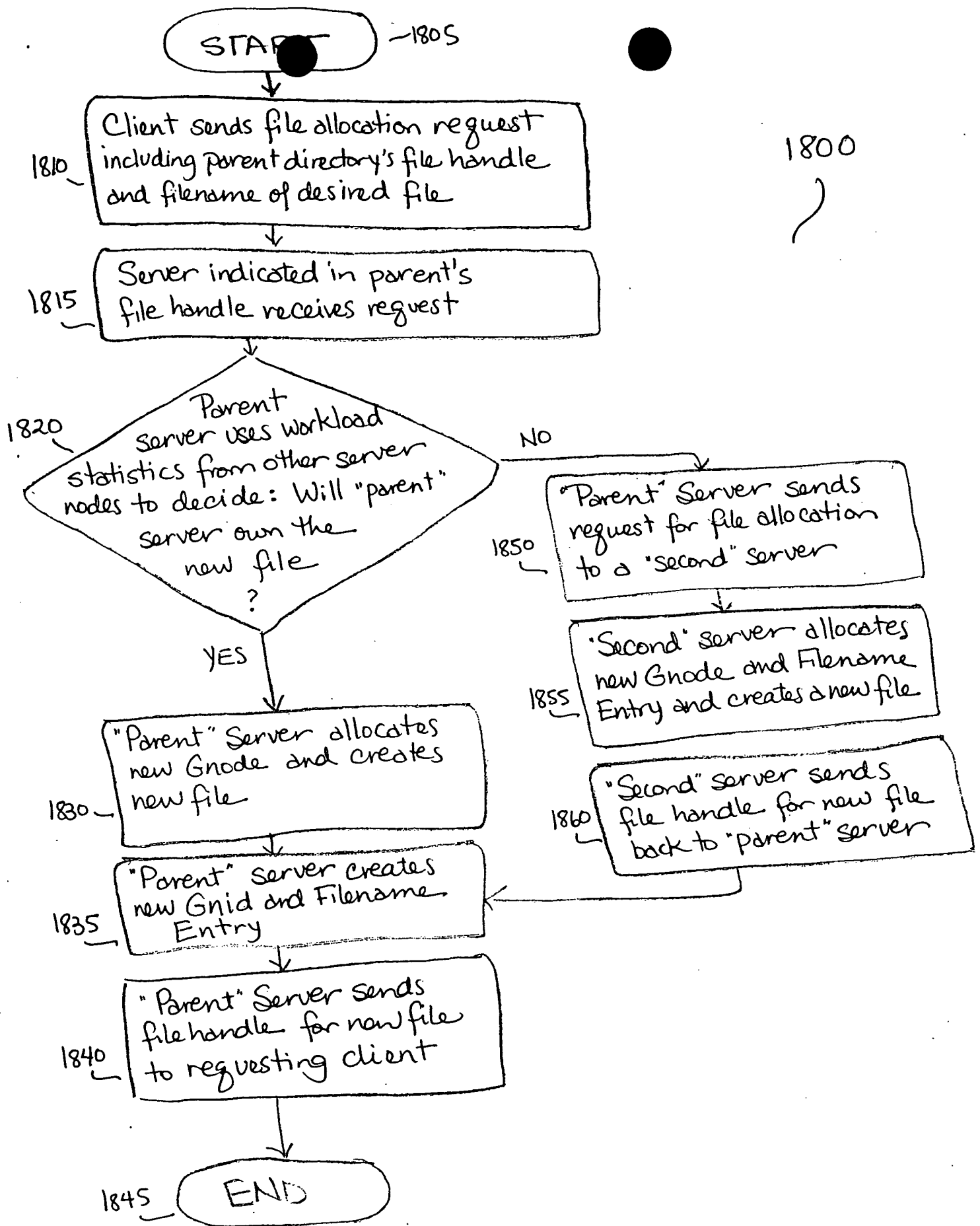


FIGURE 18 - File Allocation

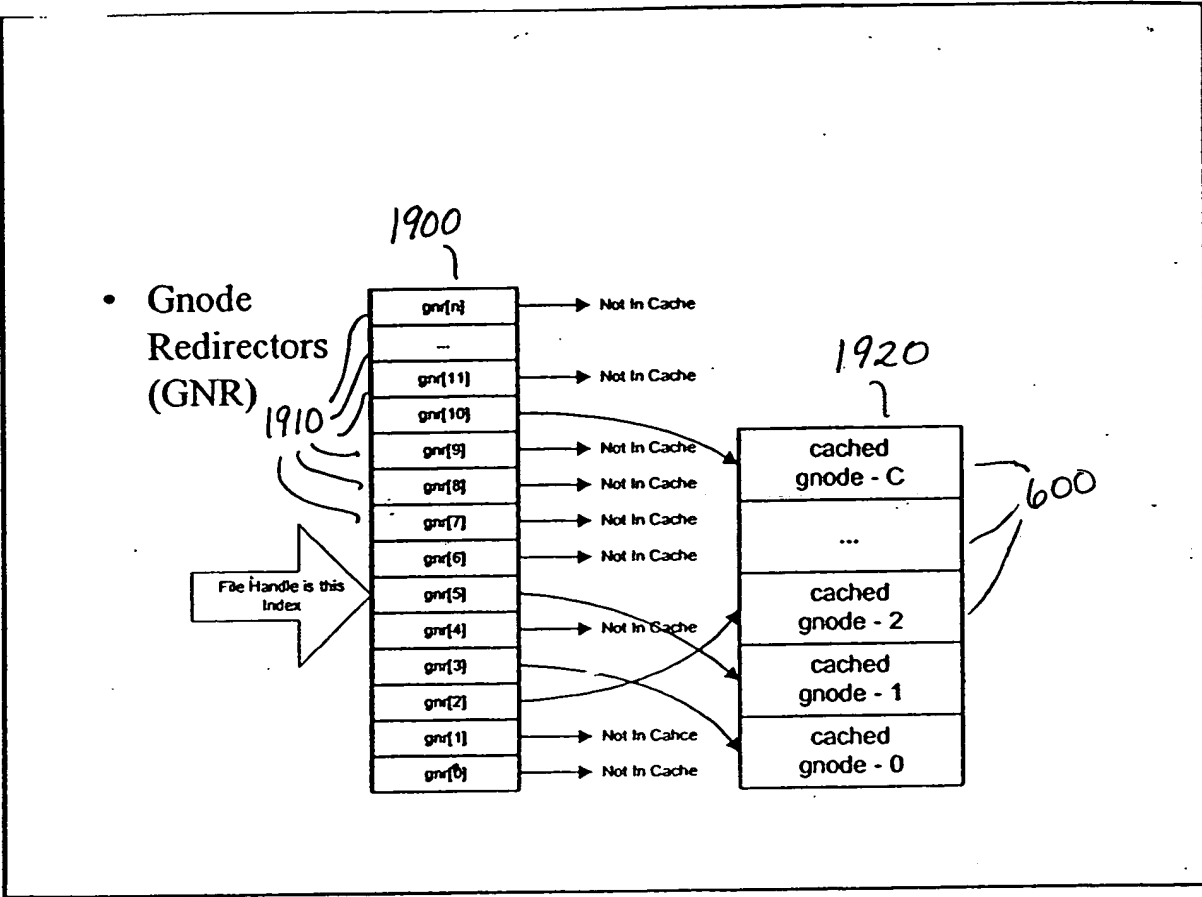


FIGURE 19

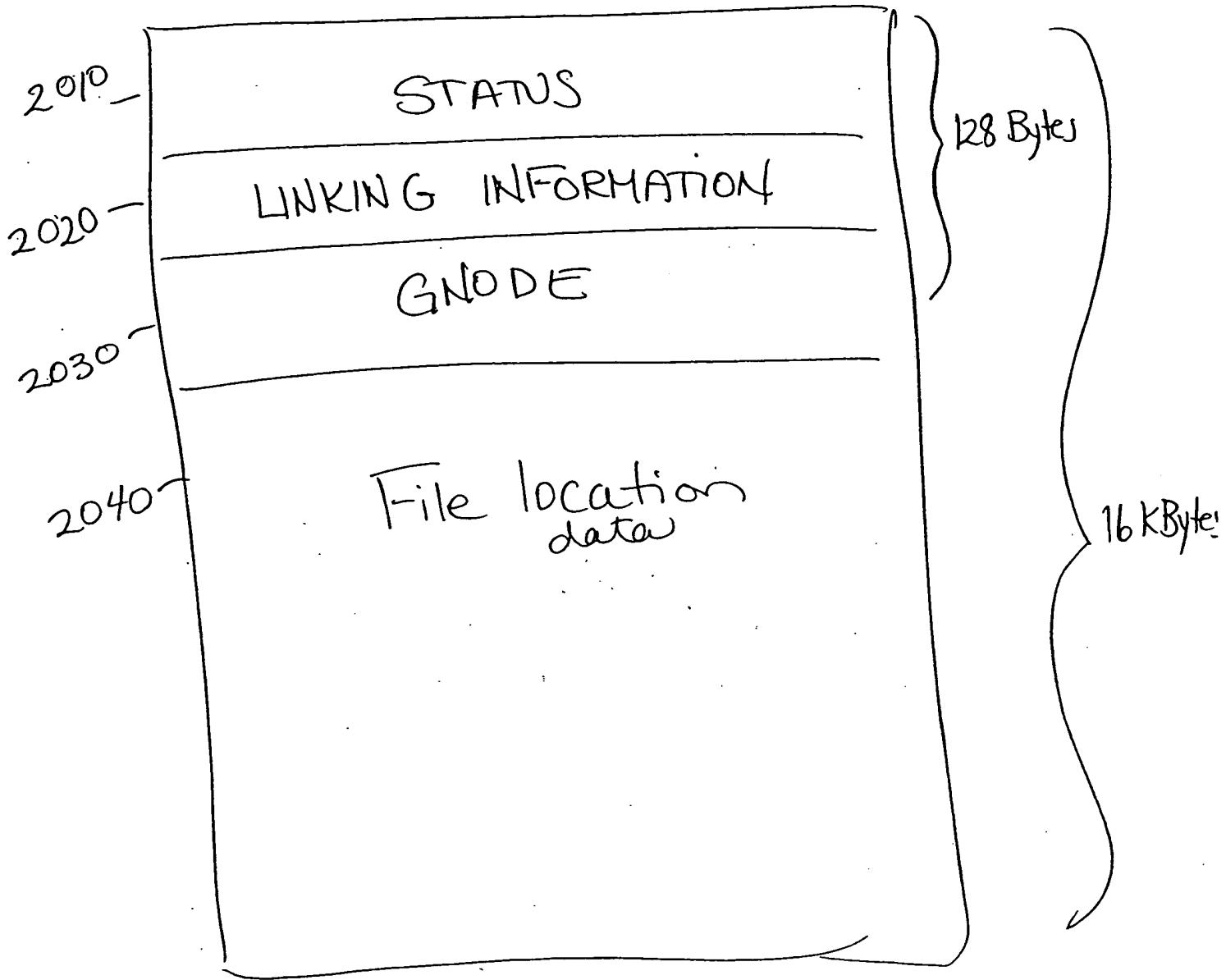


Figure 20a

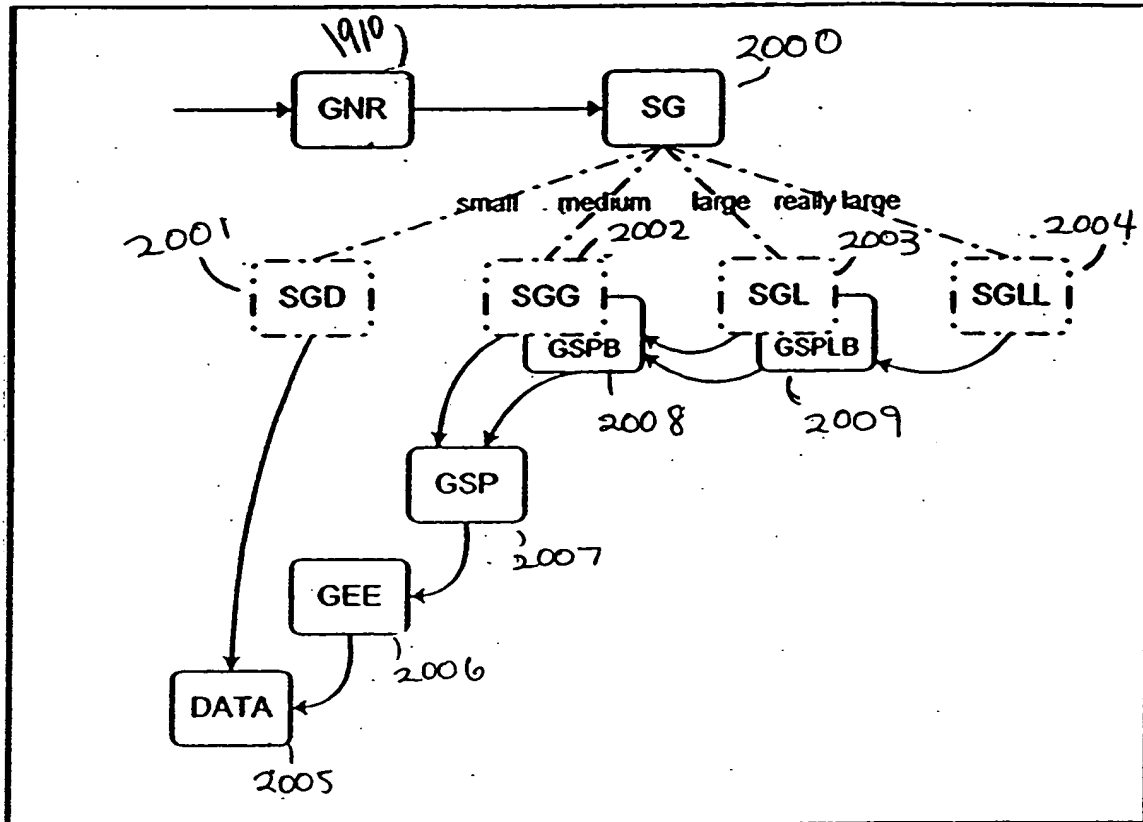


FIGURE 20b

# CONVENTIONAL RAID MAPPING (PRIOR ART)

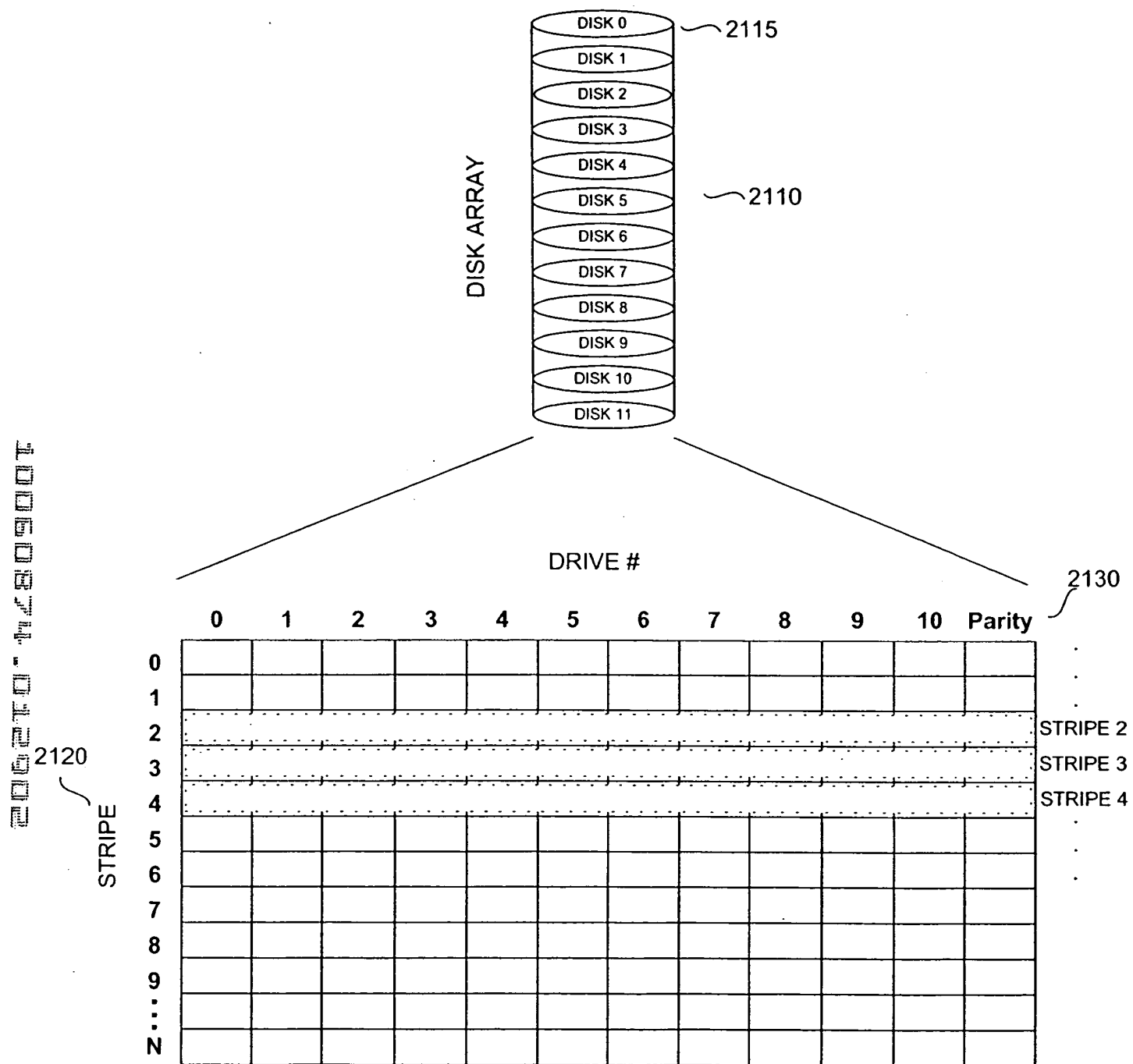


FIGURE 21

FIGURE 22A

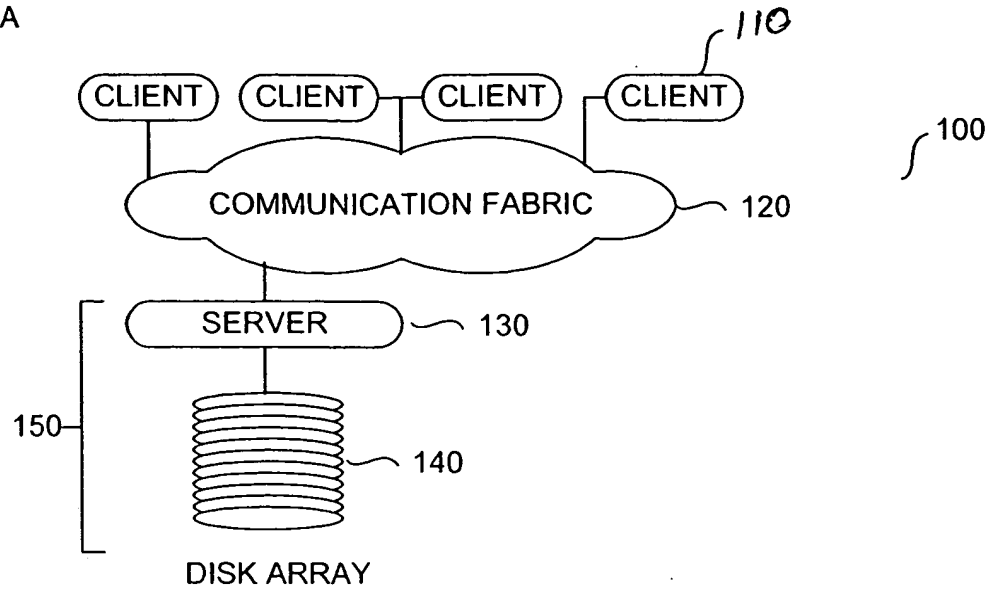


FIGURE 22B

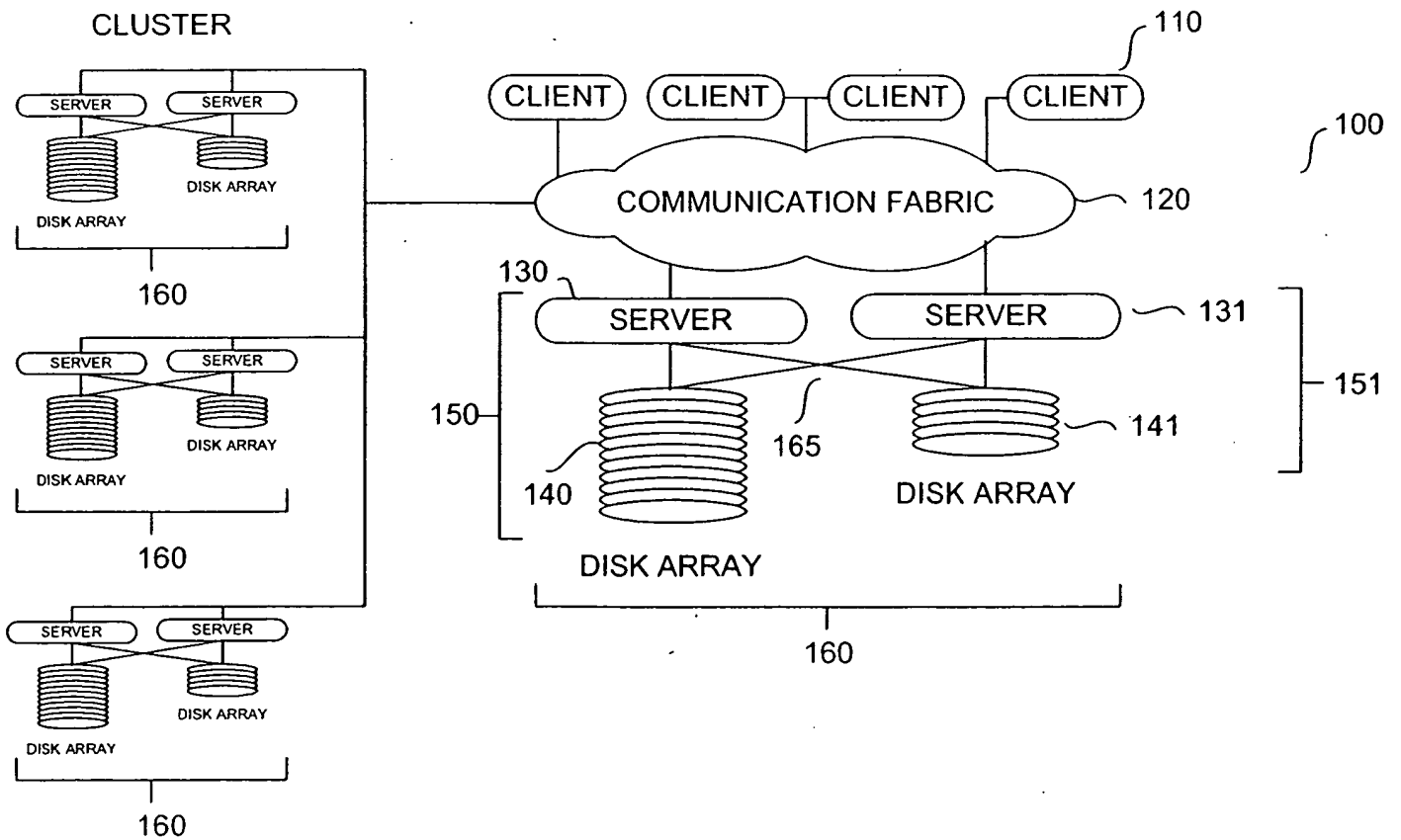


FIGURE 23

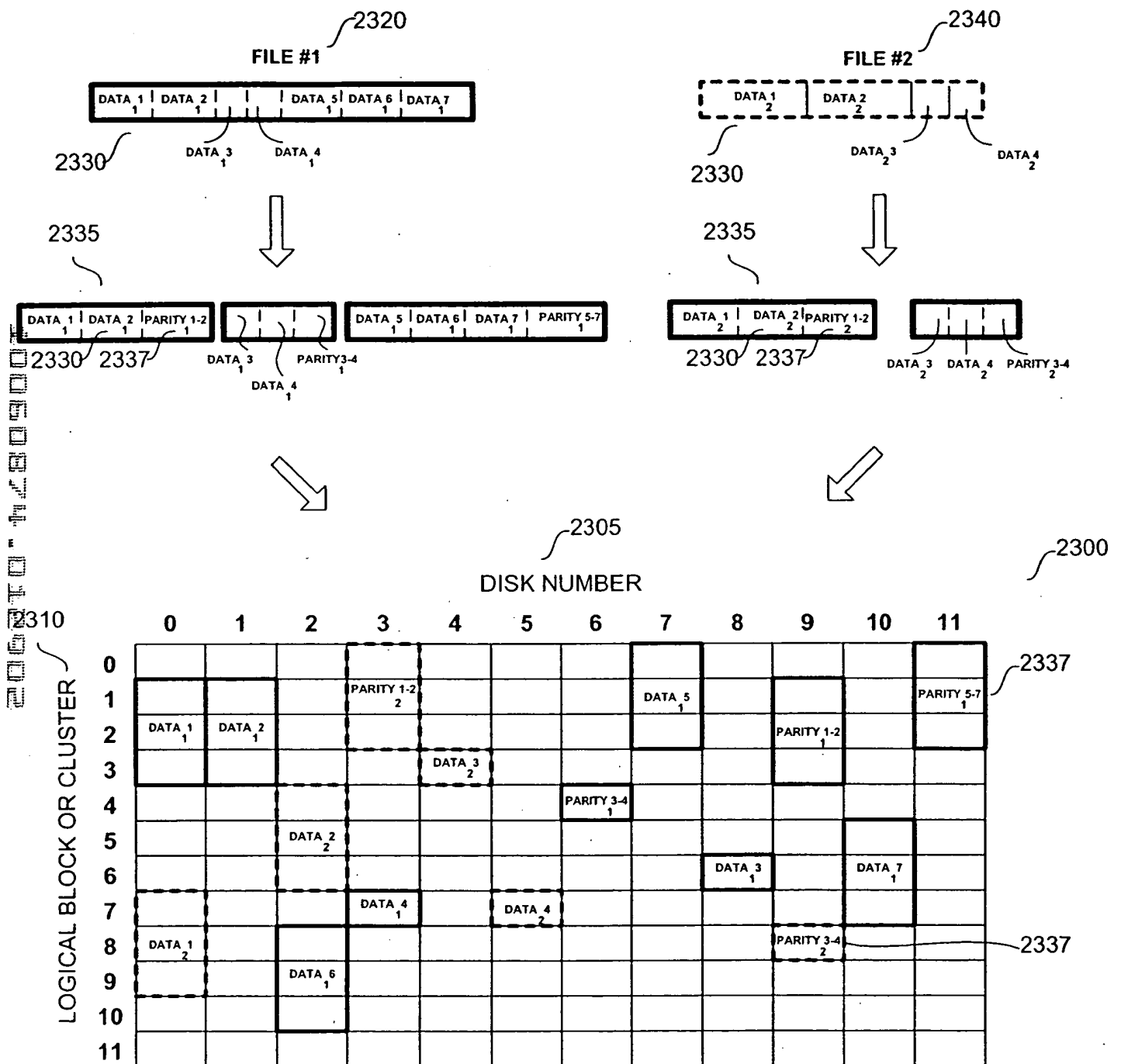




FIGURE 24A

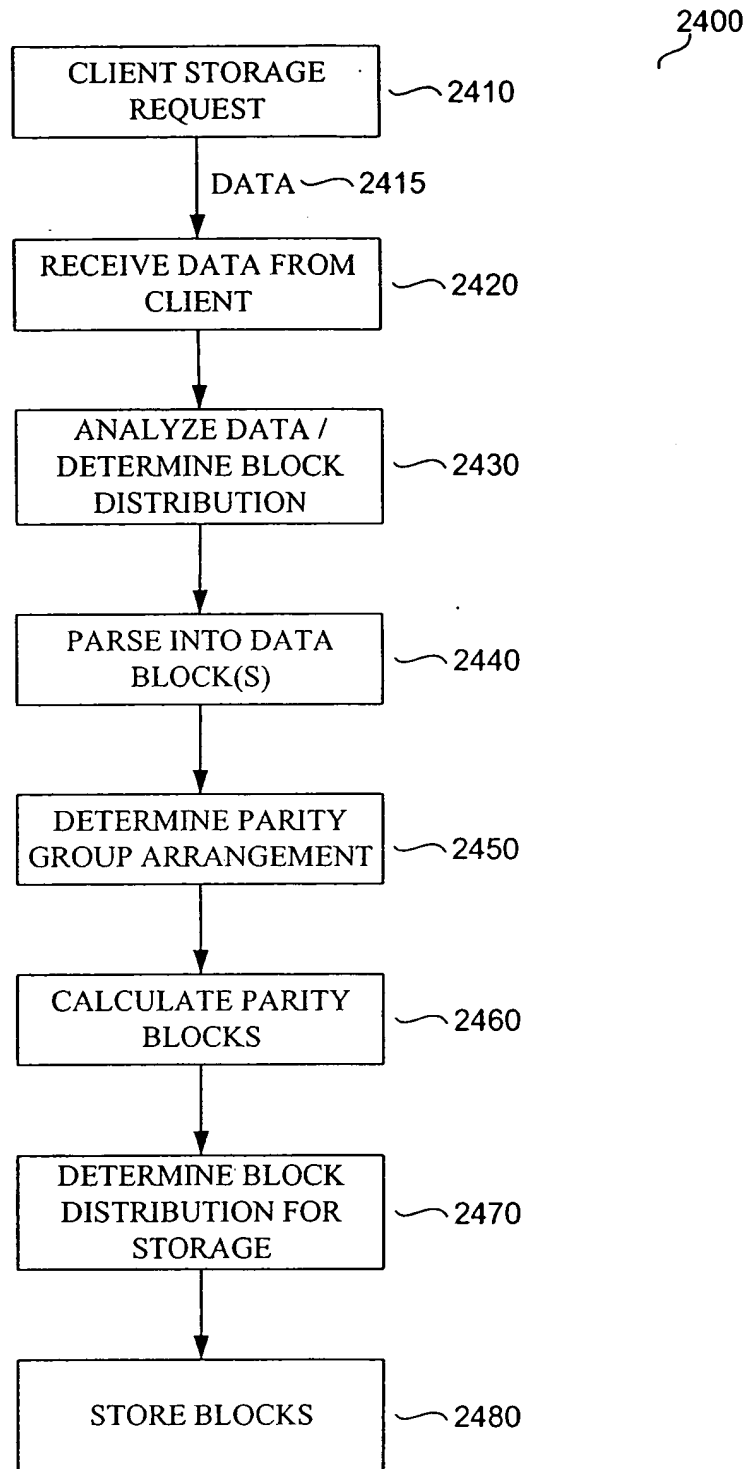


FIGURE 24B

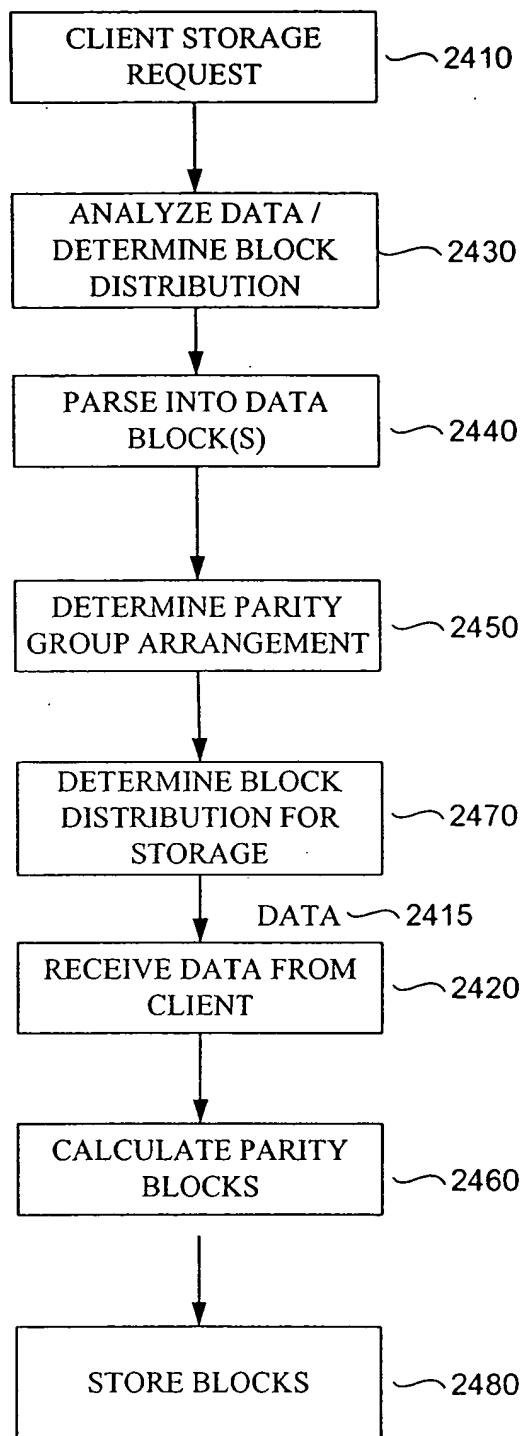


FIGURE 25

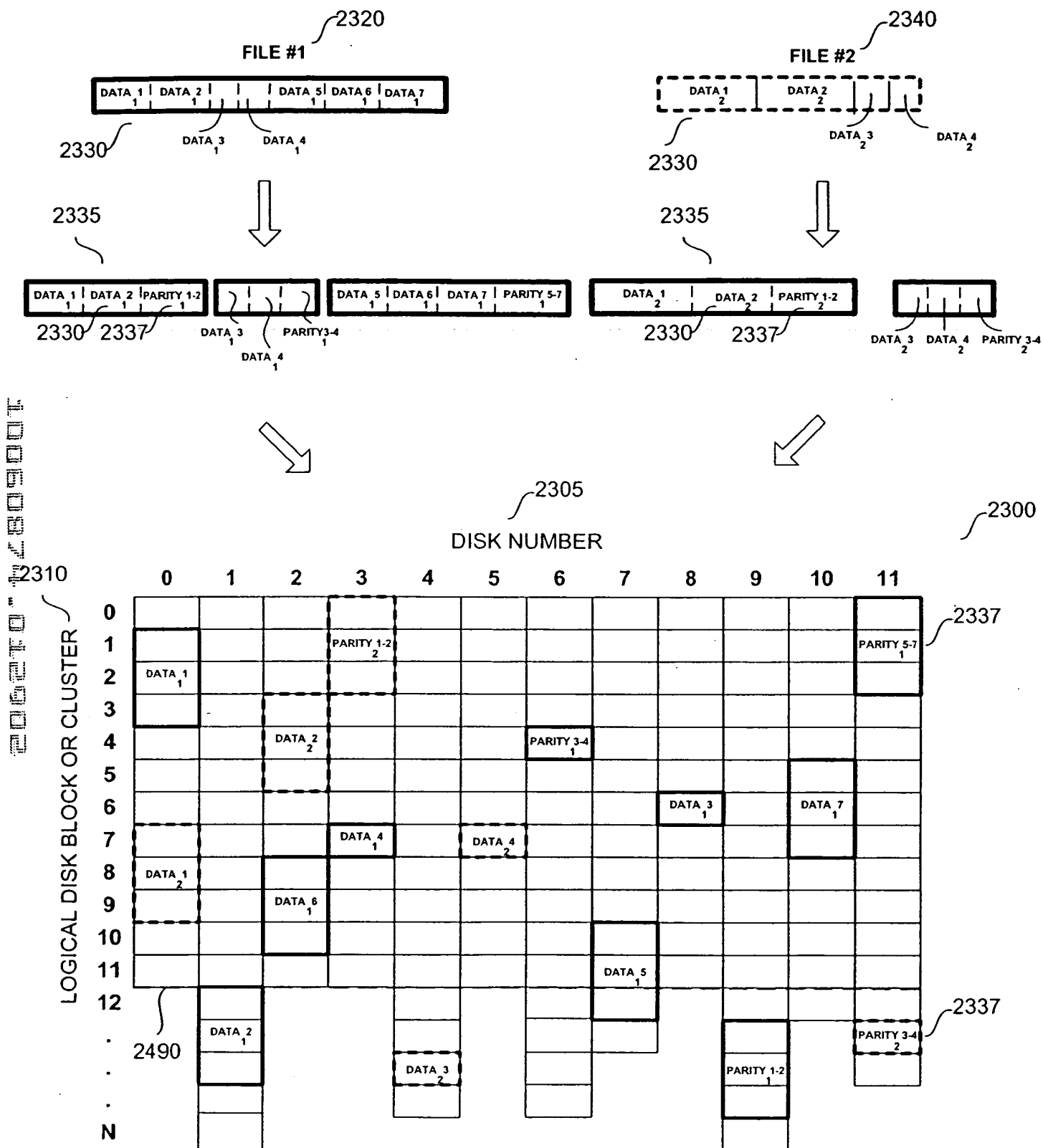


FIGURE 26A

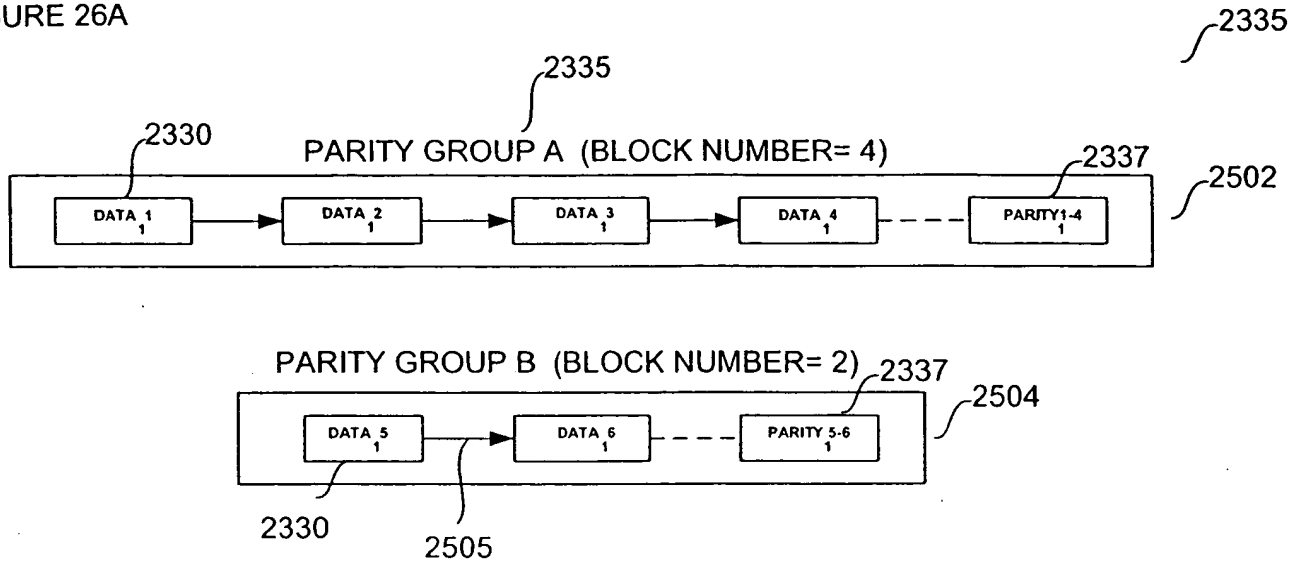
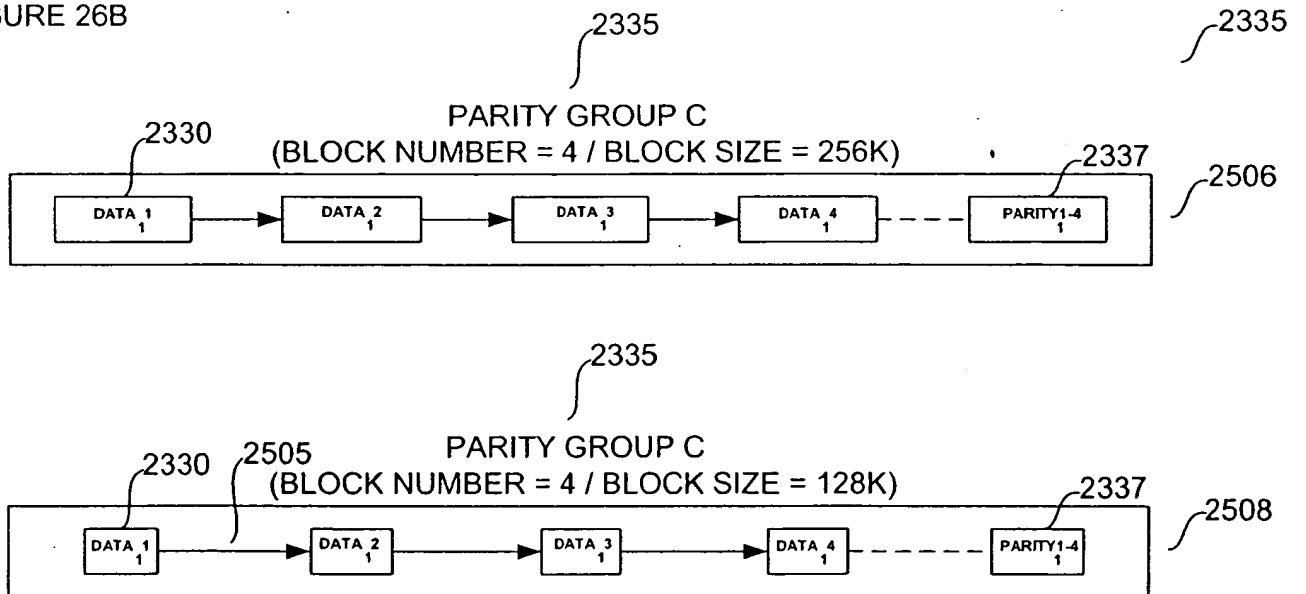


FIGURE 26B



# DISK ARRAY INITIALIZATION USING GEE TABLE SPACE ALLOCATION

2530

20020-1120900T

2532	2534	2536	
INDEX	G-CODE	DATA	2542
...	...	...	
45	GNODE	EXTENT=2	
2538 46	DATA	BLOCKS 456, 457: Drive 13	
47	DATA	BLOCKS 667, 668: Drive 15	2540
48	DATA	BLOCKS 112, 113: Drive 19	
49	PARITY	BLOCKS 554, 555: Drive 2	
...	...	...	
76	GNODE	EXTENT=3	
2538 77	DATA	BLOCKS 460, 461, 462: Drive 13	
78	DATA	BLOCKS 671, 672, 673: Drive 15	2540
79	PARITY	BLOCKS 121, 122, 123: Drive 19	
...	...	...	
88	GNODE	EXTENT=2	
89	DATA	BLOCKS 463, 464, 465: Drive 2	
90	DATA	BLOCKS 674, 675, 676: Drive 5	2540
91	PARITY	BLOCKS 124, 125, 126: Drive 13	
...			

FIGURE 27

## ARRAY PREPARATION / G-TABLE FORMATTING

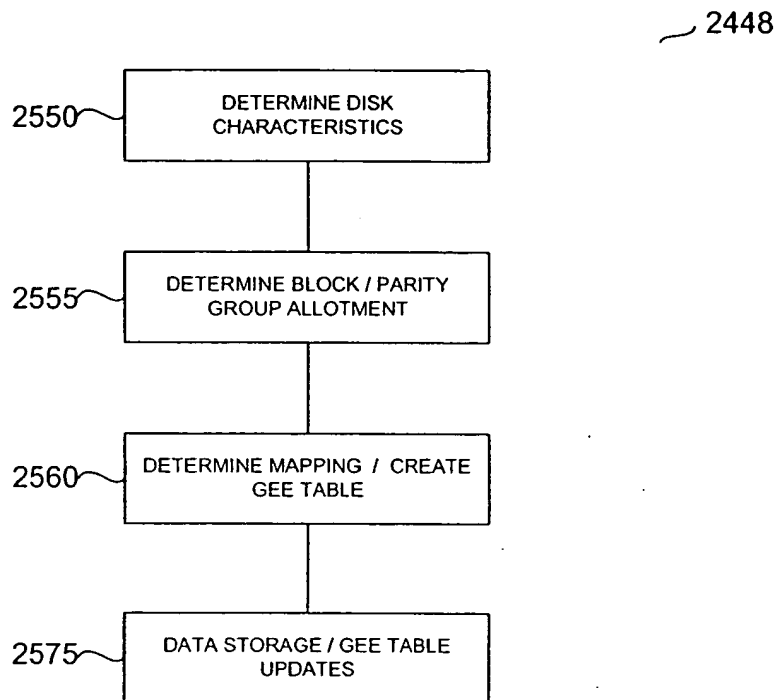


FIGURE 28

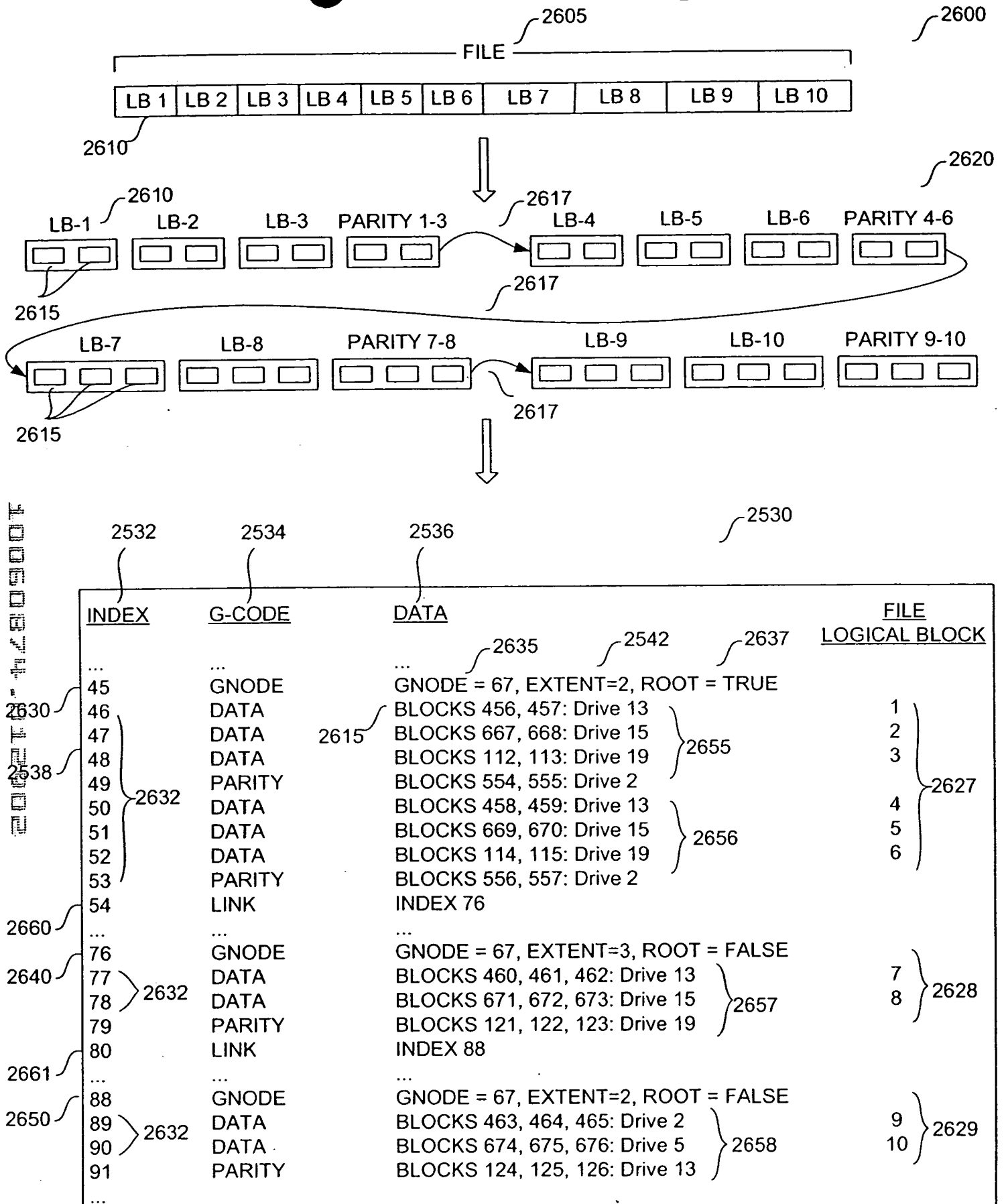


FIGURE 29

# DRIVE FAILURE RECOVERY MECHANISM

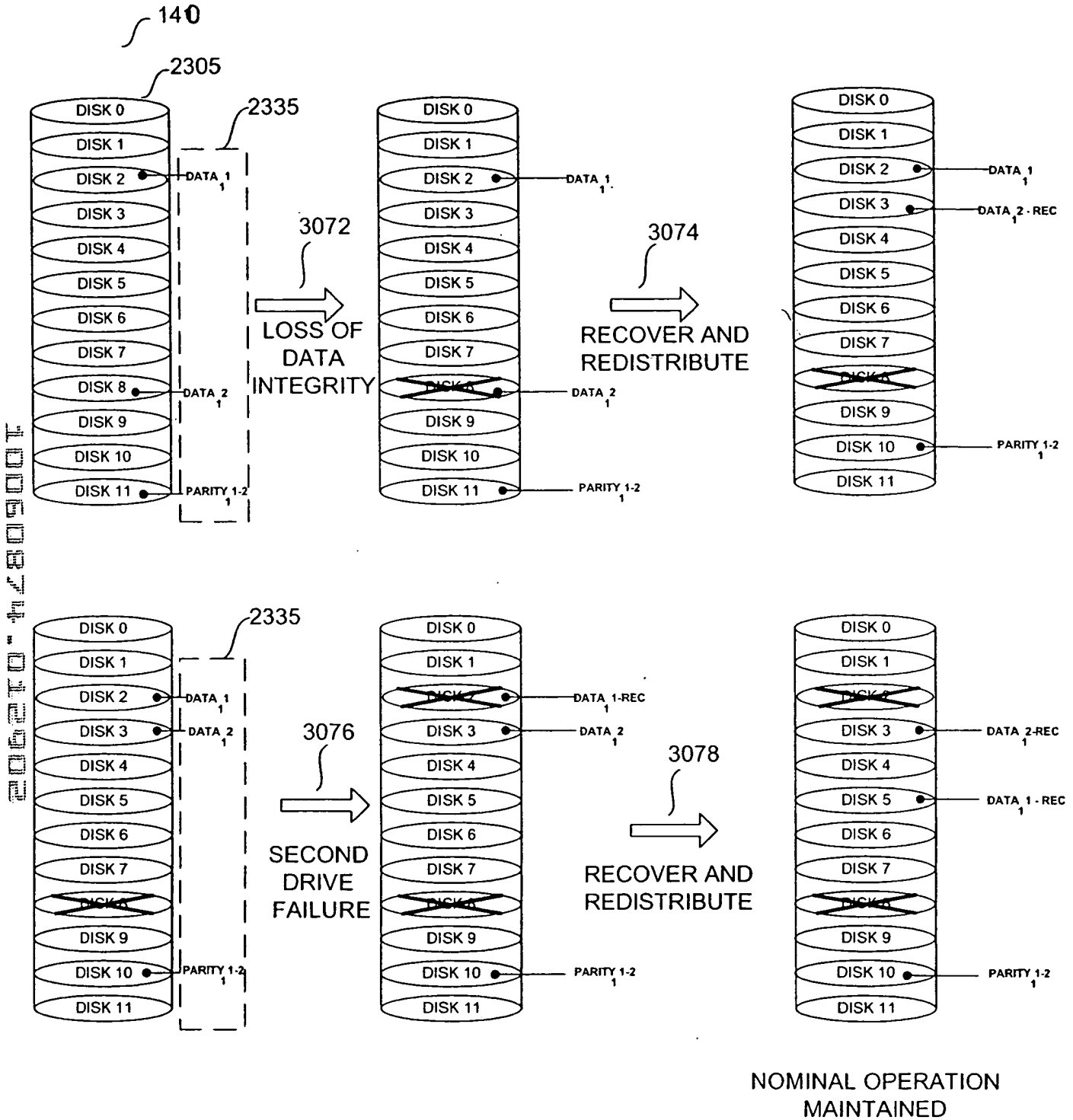


FIGURE 30



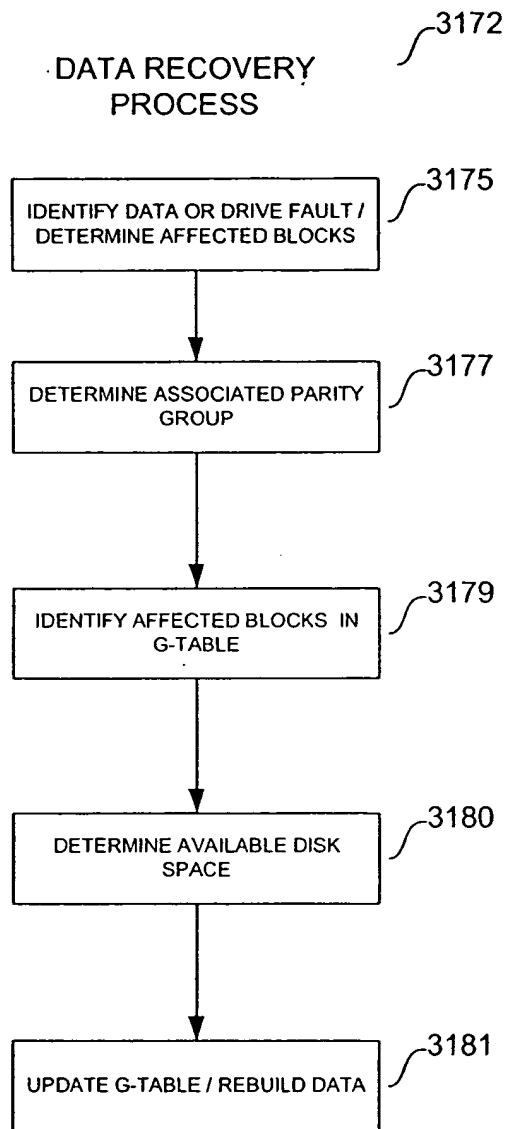
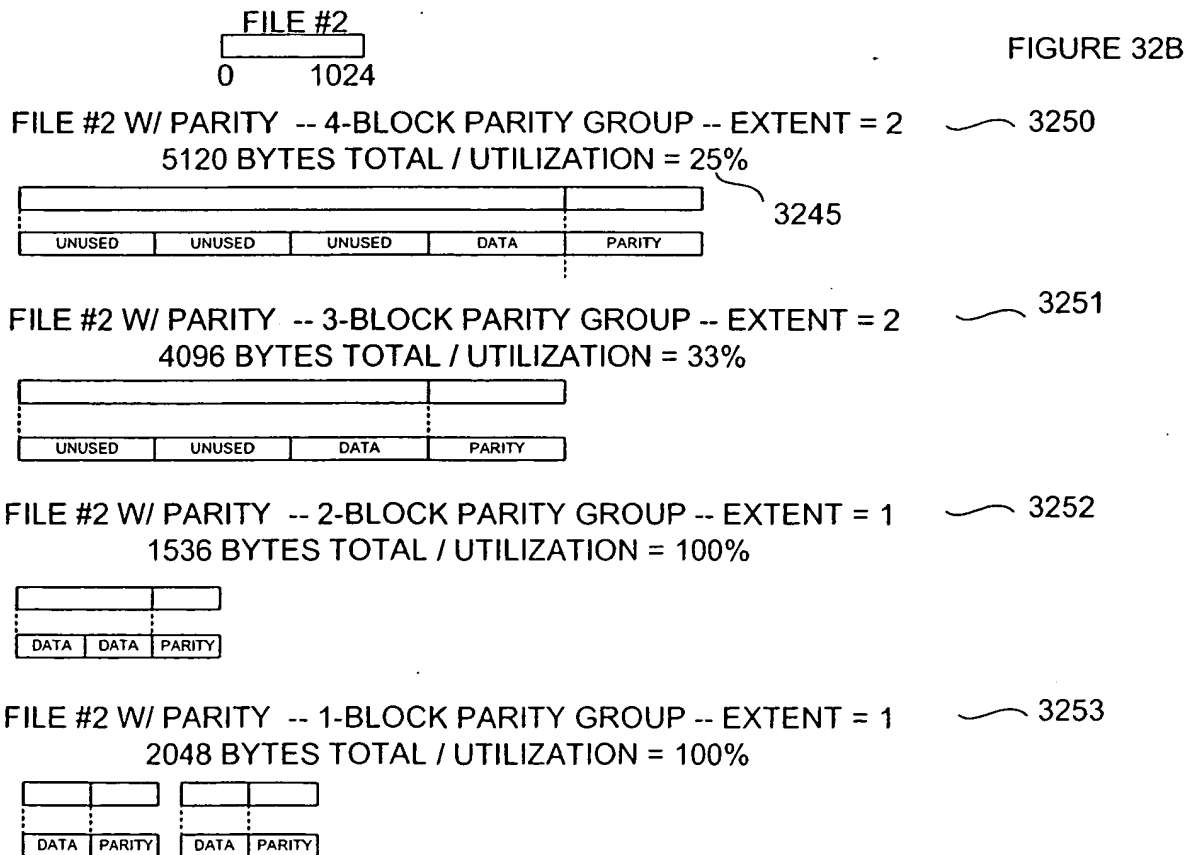
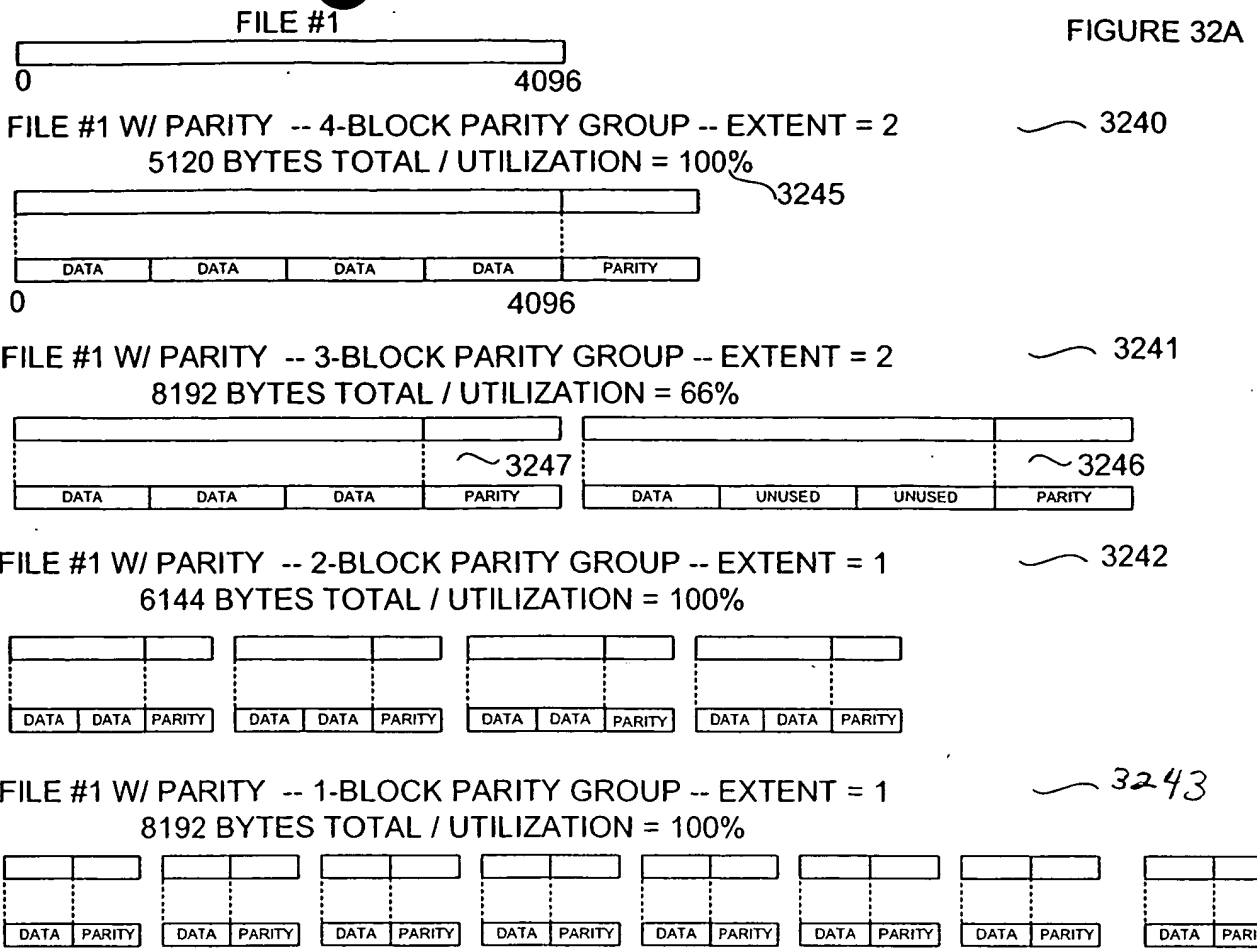


FIGURE 31



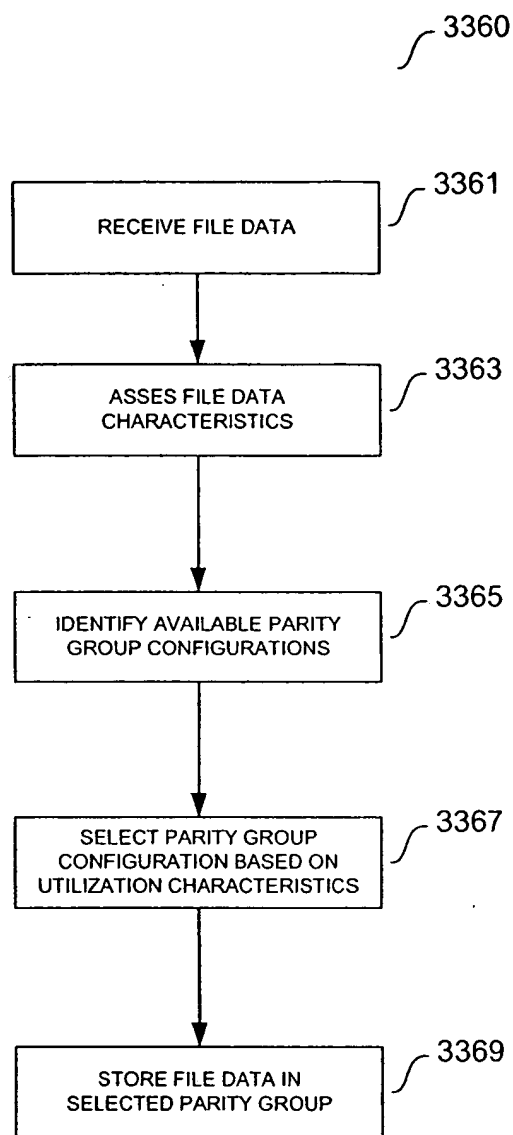


FIGURE 33

FIGURE 34A

INITIAL ALLOCATION				DISK SPACE %
<div>DATA DATA DATA DATA PARITY</div>	4 block parity	3480	10000 groups	36%
<div>DATA DATA DATA PARITY</div>	3 block parity	3481	10000 groups	28%
<div>DATA DATA PARITY</div>	2 block parity	3482	10000 groups	22%
<div>DATA PARITY</div>	1 block parity	3483	10000 groups	14%

DISK USAGE 3487

FIGURE 34B

	3492 FREE	OCCUPIED 3490	TOTAL	DISK SPACE %
3480 4 block parity	2500 groups	7500 groups	10000 groups	36%
3481 3 block parity	7500 groups	2500 groups	10000 groups	28%
3482 2 block parity	3500 groups	6500 groups	10000 groups	22%
3483 1 block parity	500 groups	9500 groups	10000 groups	14%

REDISTRIBUTION 3494

FIGURE 34C

	3492 FREE	OCCUPIED 3490	TOTAL	DISK SPACE %
3480 4 block parity	2500 groups	7500 groups	10000 groups	36%
3481 3 block parity	2500 groups	2500 groups	5000 groups	14%
3482 2 block parity	3500 groups	6500 groups	10000 groups	22%
3483 1 block parity	10500 groups	9500 groups	20000 groups	28%

-5000 groups of 3 block parity  
 +10000 groups of 1 block parity

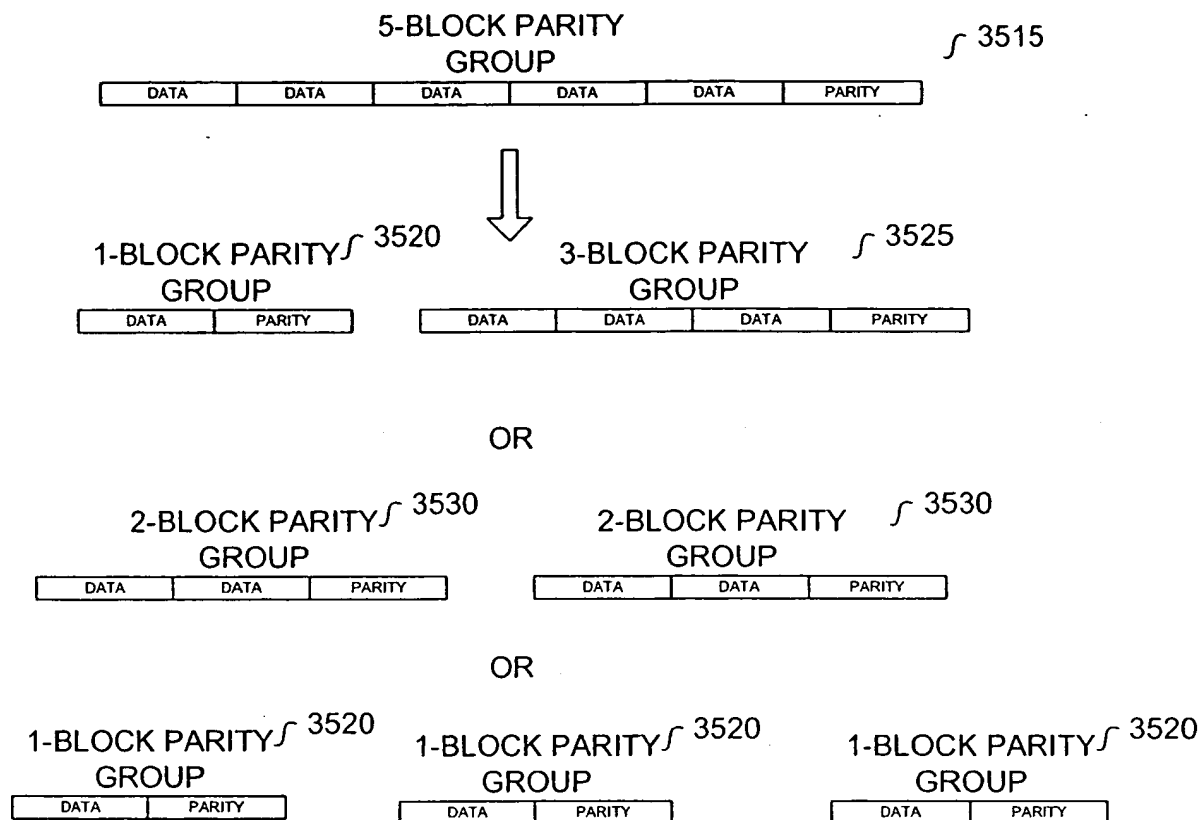
REDISTRIBUTION

20250701 14:30:00

3500

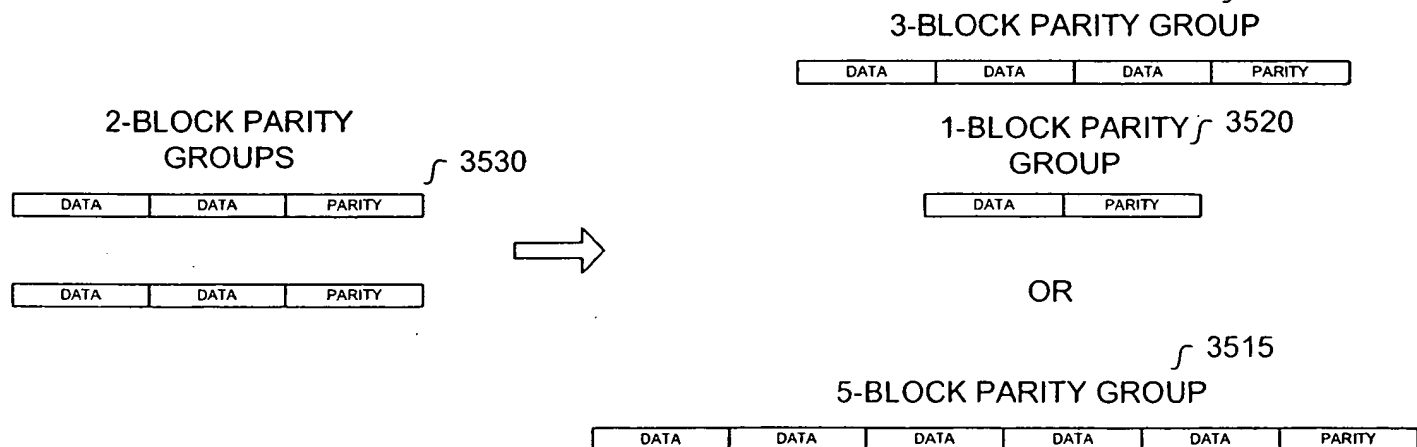
3510

## PARITY GROUP DISSOLUTION



3535

3525



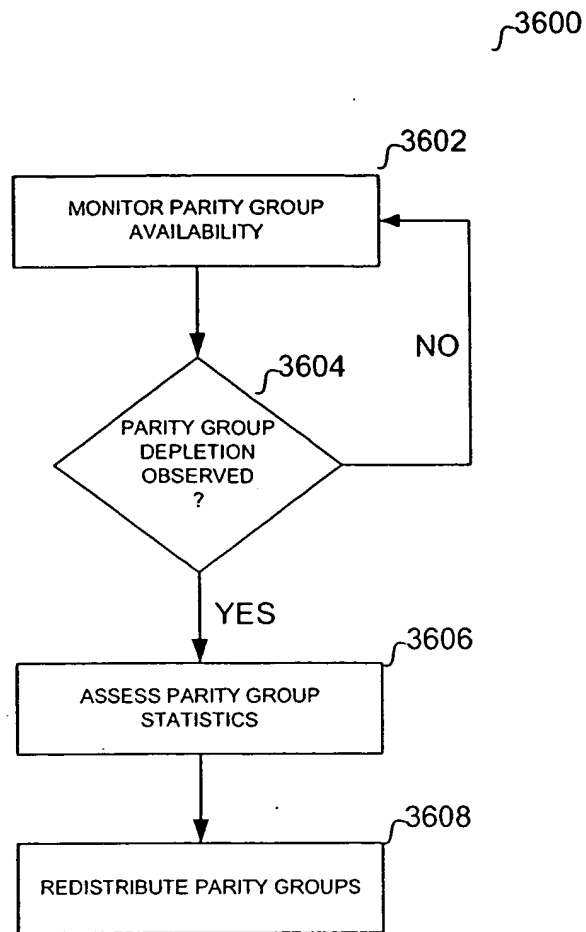


FIGURE 36

206270-42809001

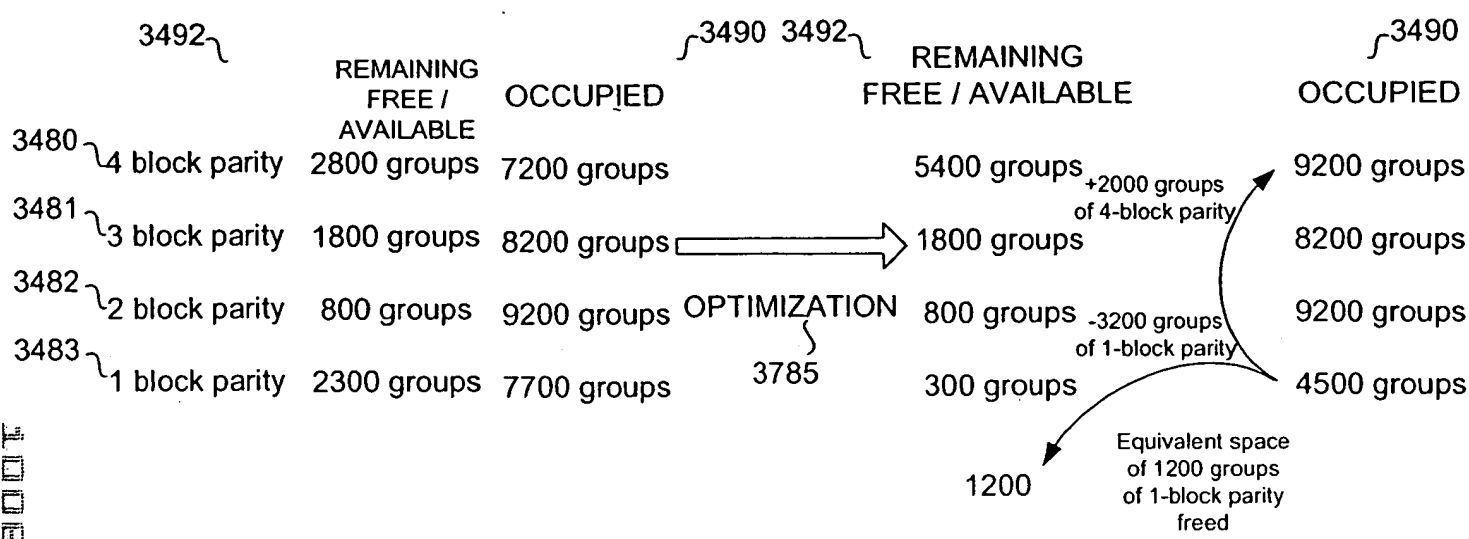


FIGURE 37

20250310-142800T

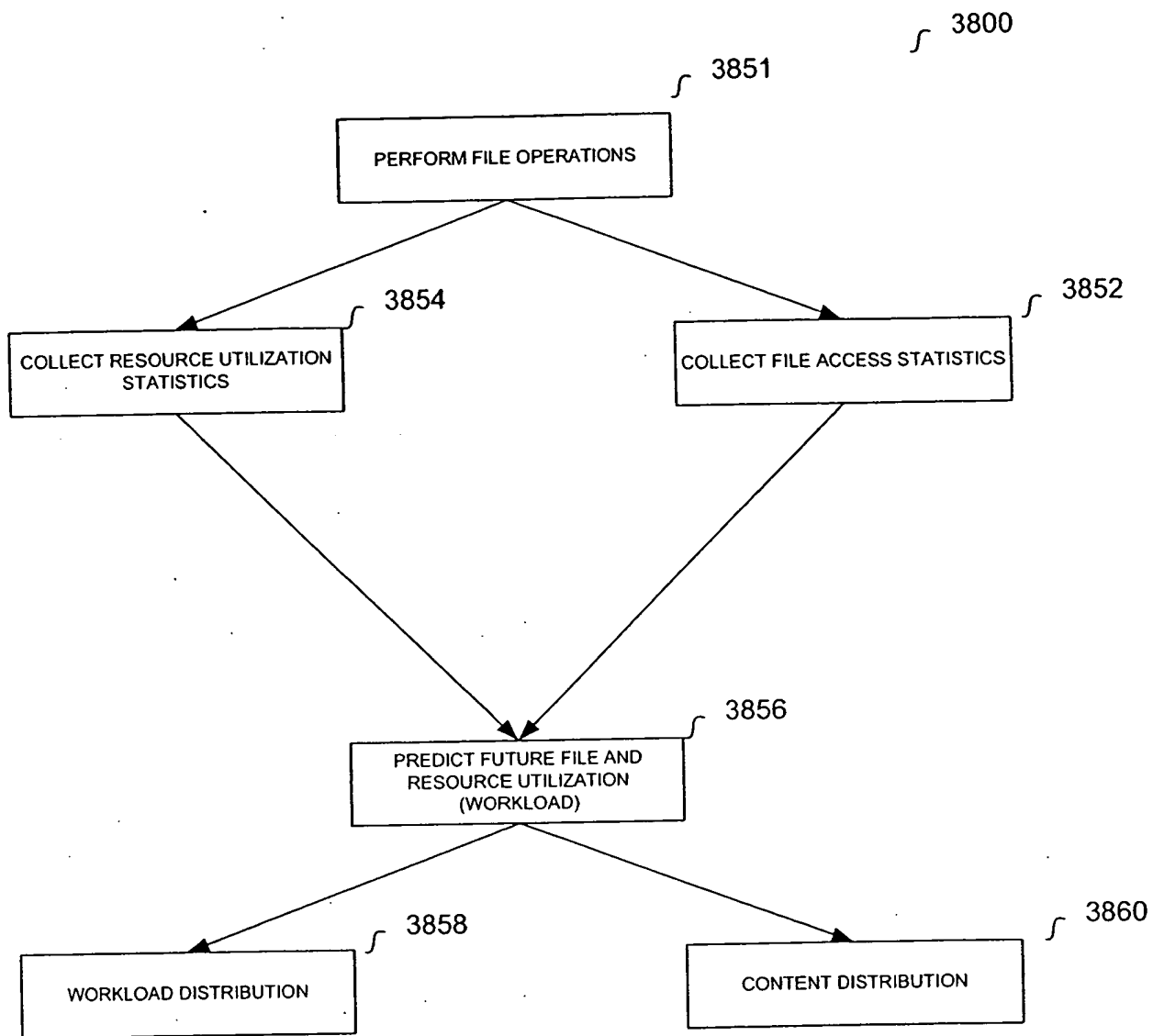


FIGURE 38



3900

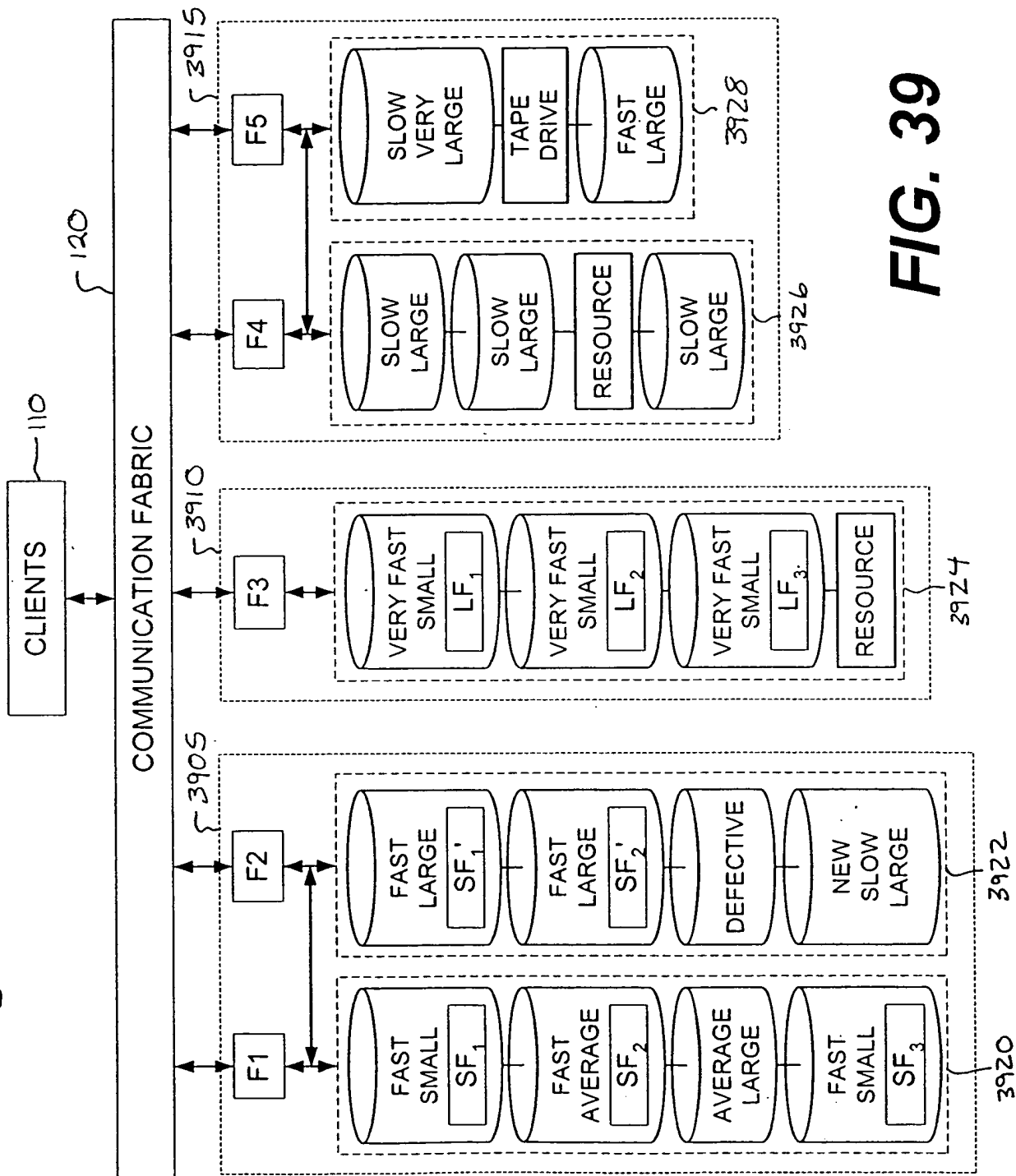


FIG. 39

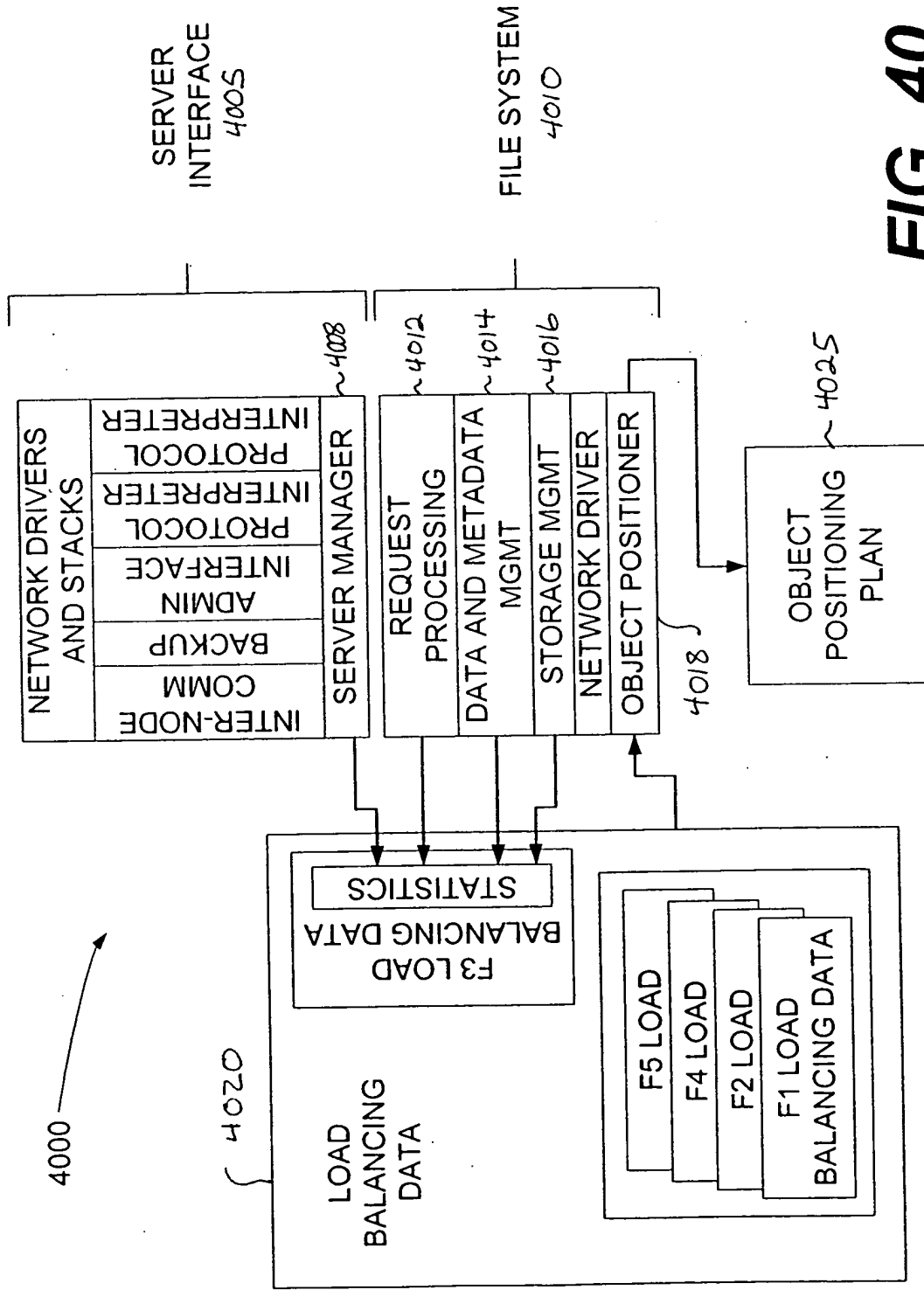


FIG. 40

F3 OBJECT  
POSITIONING PLAN

- Push LF to F4-F5 Cluster
- Issue File Handle For LF = Stale
- If Requested,
  - Send acceptance for copy of SF to F1
  - Create copy of SF
  - Send file handle of SF to F1

4025  
↗

**FIG. 41**

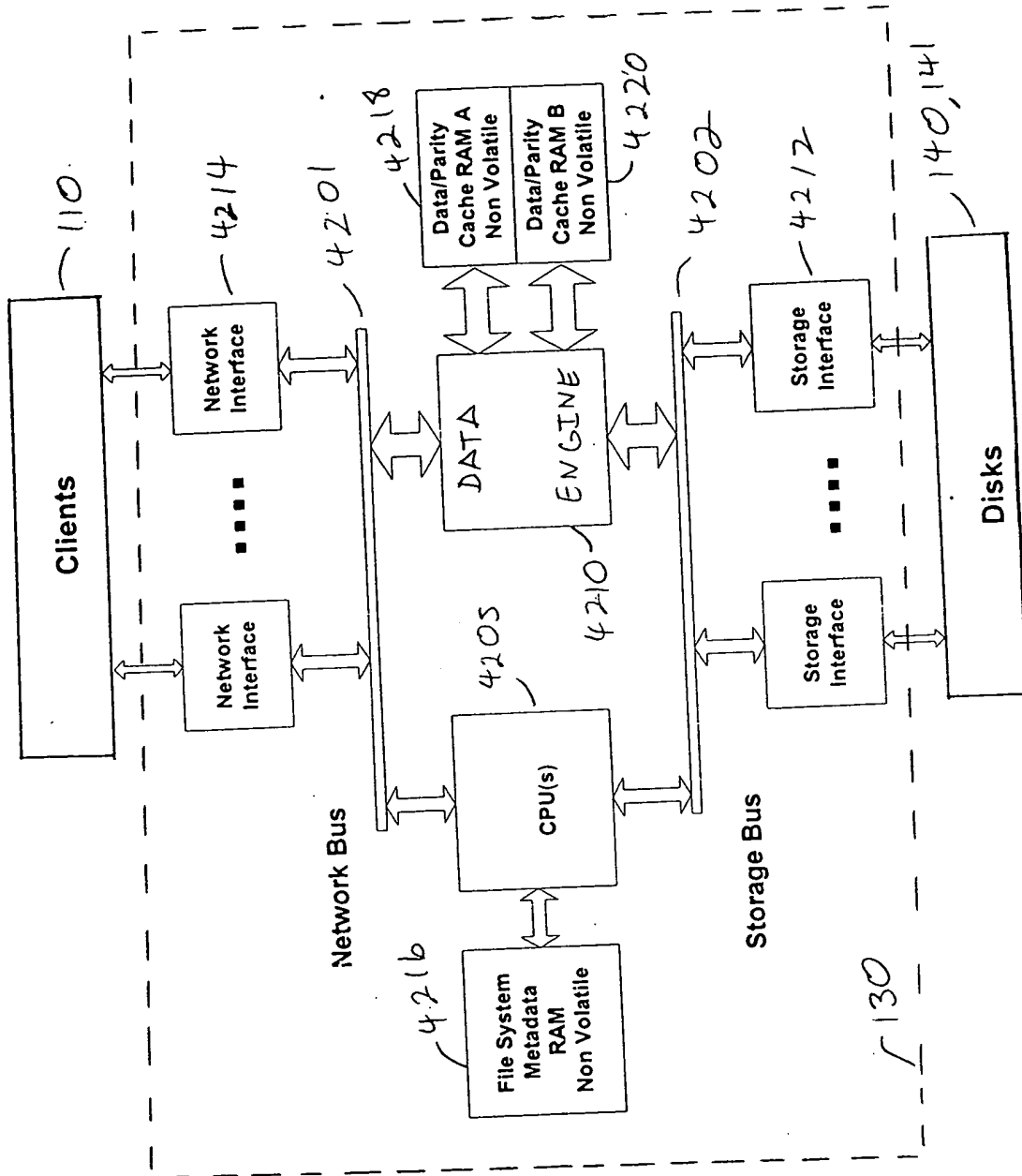


FIGURE 42

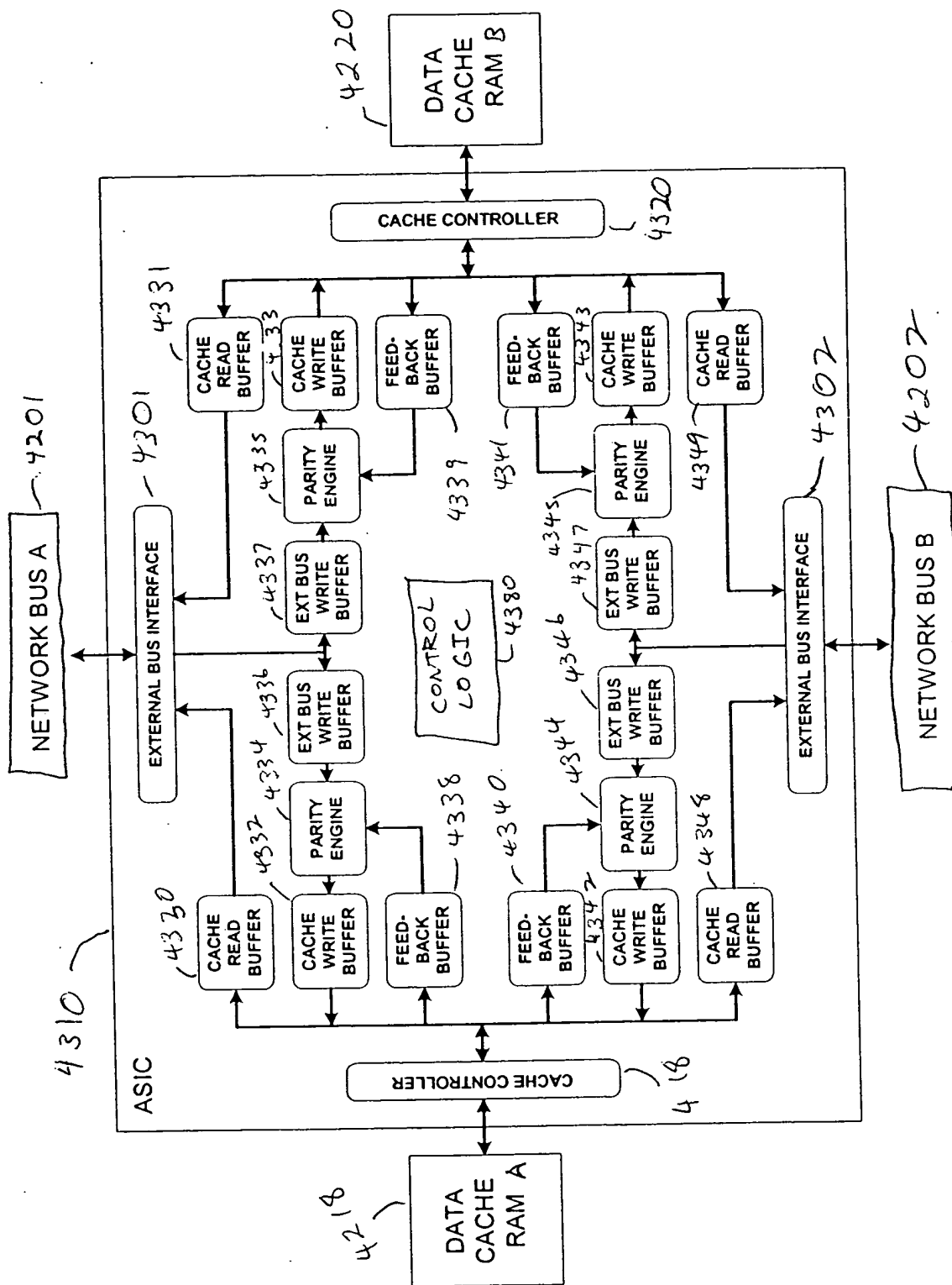


FIGURE 43

206210-42303007

PCI map	Block Size	Opcode	Spare	Parity Index	Spare	RAM Adr
63----	62, 61----	59, 58----	56, 55----	51, 50----	35, 34, 32,	31-----0

4400

FIGURE

44